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Sixth President of the Hawaiian Sugar Planters' Association, for four years in succession—1889-1892.

NEW YORK SUGAR TRADE.—March 31.—Receipts for the week show a large falling off. Refiners showed more interest and met the views of holders by paying steadily advancing prices, until the close, when large sales were made on the basis of 3⅝c. for 96° test Centrifugals, 3½c. for 89° test Muscovados and 2⅝c. for 89° test Molasses sugars, being 3-16c. above last week's basis. It is thought that at 3⅝c. for 96° test, the holders in Cuba will ship sugars here more freely and thus avoid waiting many weeks for reduction in duties, paying heavy carrying charges, loss in test by deterioration of sugar and risk of market. Sugars from British West Indies will, also, probably be offered here more freely, as the English Chancelor has intimated that the Budget will not provide for any preferential duties on Colonial sugars, pending the abolition of the European bounties.

The weather throughout the group has been quite stormy and wet, in some places retarding the field and mill work, for a short period only. The crops have not suffered to any great extent, though it is doubtful whether the yield of sugar will equal that of last year, which was an unusually prosperous one. Although the public roads are gradually being improved each year, yet in some districts they become almost impassable for weeks together. More care should be taken during the dry season to guard against these annual freshets. Whether oil can be used to advantage still remains a mooted question, at least in country districts.

The attention of farmers, but more especially of rice growers, is directed to Prof. Crawley's article on fertilizing land that is often cropped, without being properly fertilized. It refers to rice land chiefly, which is often overworked. But the principle involved applies to all farm lands that are kept in constant cultivation, without rest and without proper fertilization. Rice land in our group is very limited, and for this reason more care should be taken to keep it in the best possible condition by the use of the best fertilizers.

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CONCERNING CUBA.

Since the close of the Cuban war, some three years since, much has been published regarding the obligation of the United States to assist the sugar planters of Cuba on account of losses sustained by them during the war. The form of assistance proposed is to allow Cuban sugars to enter into the United States under a nominal duty, while sugar from all other foreign countries shall pay the full rates. This proposition has created a very strong opposition from those interested in making sugar from cane and beets, as it has not been shown that the Cubans would really be benefitted by it, and that the Sugar Trust, which has purchased the Cuban crop

would be the principal beneficiary. A planter who visited Cuba to examine the situation writes the following to the New Orleans Times, which probably is a correct statement:

"The warehouses in Havana are full, and all the sugar is this year's crop. I was told that not a pound of sugar had been shipped. The reason for this astonishing state of affairs is that the American Sugar Refining Company has bought the crop of Cuba, and is storing it in the hope of getting a reduction on the tariff shortly. If this occurs, they will make from $14,000,000 to $16,000,000 by the operation. The Cubans have no sugar on their plantations. They sell it as fast as they make it, and the trust buys it and stores it. That is why there is such a lusty cry for reciprocity and a reduction of the tariff. It means that the trust has more interest in the matter than anybody else. I did not find any Cubans making a kick for reciprocity. I heard a great deal of talk about a reduction of tariff duties, and what little I did hear came from the Americans, who own the sugar lands of the island. In fact, I was informed that the Cubans generally were unaware of the fight for reciprocity until it had reached an acute stage, and then some of them were induced to lend their influence to the efforts of the Americans in the hope of making more money than they otherwise would have made. So far as the necessity for doing something for the Cubans is concerned, I did not find it. In fact, everybody with whom I talked told me that all the labor in the island is now employed at better wages than we pay in Louisiana, and that there is work for every able bodied man. Laborers are paid at the rate of $30 per month, and I am sure that this is remunerative and could not be considered starvation figures. The wages now paid are from 75 to 80 per cent higher than during Spanish rule, and the tax rate has been cut almost in half. In Havana I did not see any idle people. Everybody seemed to have plenty of business, and to be prosperous. If there is any starvation, it is hidden."

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FIRST EXPERIMENTS IN QUEENSLAND.

When Doctor Maxwell took charge of the Mackay Station, the varieties of cane under growth were exclusively such as had been introduced from New Guinea, of which there were some seventy different kinds. The condition of those varieties was extremely unpromising, due in a large measure to the drought. The cultivation, however, was changed, and certain special mixtures of manure were applied. Fortunately, good rain set in at the time, continuing in abundance through the growing season, the result being that an immediate growth began, which continued, and at a rate that the Director had never observed, even in countries such as Hawaii. Between 1st January and June a growth had been

made which was simply astounding, the cane which at the end of December did not show one joint, and was actually dying out, having developed so as to yield a crop of a very notable character. In the month of August the whole of these seventy varieties of cane were cut, weighed, analysed, and the weight of cane and the weight of sugar produced per acre by each variety determined. It is necessary, however, to repeat the experiments before making a full publication of the behaviour of each variety, as it does not do to draw conclusions from single tests especially if these are made on a small scale. Nevertheless, these determinations of the value of the different New Guinea varieties as sugar-producing canes indicate variations between very wide extremes. One variety gave less than twelve tons of cane per acre, while another gave between sixty and seventy tons, under the same conditions of cultivation and manuring. With regard to the sugar content of the cane, and the production of sugar per acre, one variety produced only a trifle over one ton of sugar per acre, while another actually produced ten tons of sugar per acre, and fifteen varieties produced over six tons of sugar per acre each. It may be safely said that this experiment in good cultivation, and with manures adapted to the nature of the soil and to the crop, at the Mackay station during the past year, fully confirms the Director's statement made in his report to Queensland Government two years ago concerning the possibility of sugar production upon the Queensland soils, if the most modern practices in cane cultivation and in the application of manures are followed.—Brisbane Courier.

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WORK OF THE SUGAR CONFERENCE.

A Washington special says: A cablegram received in Washington conveys the information that the sugar conference has reached an agreement. The conference has agreed that on Sept. 1, 1903, all sugar bounties are to be abolished, and that after that date countervailing duties may be levied on sugar products in countries where the kartel system prevails. It is believed that the action of the conference will within the coming year relieve the sugar situation by restoring normal conditions. The production of sugar has been stimulated by the government bounties and the indirect bounties derived from the kartel system. By the abolition of the one and the imposition of countervailing duties against the other, sugar producers will now be compelled to stand on their abilities to produce sugar without government or other aid.

England has, through Mr. Lubbock, led the fight against the kartel system, although sugar has been selling in England at much less than it brought on the Continent. England's

attitude is explained by the fact that she realizes the indirect injurious results of the kartel system, and that by means of it, European countries supplied her with sugar to the detriment of her own sugar-producing colonies. A surplus of 1,000,000 tons of sugar was produced during the current year, which accounts for the low price of sugar. The removal of the artificial stimulus is expected to result in the falling off of sugar production, and the restoration of sugar to its normal profitable price. All the sugar-producing countries of the world were parties to the Brussels conference, with the exception of Russia and the United States.

The fact that the United States were not a party to the conference gives it a free hand, and, should Secretary Shaw be so inclined, he is at liberty to at once impose a countervailing duty against German and Austrian sugar, in which countries the kartel system has reached its height. It is believed by those most familiar with the sugar situation that the imposition of such countervailing duty would give Cuban sugar an advantage over the sugars of all the world, with the exception of those from Hawaii, Porto Rico and the United States in our markets, which would be equal to a reduction of 33 per cent tariff.

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A NEW SUGAR DEVICE.

It is called the "Century Sugar Apparatus." The virtues claimed for the device are that it will make sugar, that is crystallize the juice, at a cost of 25 cents per ton of cane, compared with the present cost of $1.25 per ton, and that the total equipment costs only $25,000, as against $125,000 that the equipment costs under the present plan in use, to produce the same effect. This device was built for a Mexican hacienda, the owner buying it simply on the wonderful showing made by the little model. The principle of the "Century" is practically a reversion of the old open kettle system of boiling, with application of scientific discoveries to overcome objectionable features of that system. The feature of this device is the perfect circulation. This is obtained by means of eight overflow pipes, running from the top of the boiler to a point near the bottom. The great heat inside the boiler forces the hot liquid upwards in the inner tubes, of which there are sixty-four, and it flows over into the overflow pipes, and finds its way again to the inside. In this way there is a constant circulation, and burning is impossible. The device has a tank above, and the flue from the fire box passes under it. The clarified juice is put into this tank, and heated by means of the underlying flue, so that when the masse cuite has reached a proper density and is emptied into the centrifugal tank, the hot juice can be let into the boiler, and the process con-

tinued. The whole device is very simple. In three hours the juice was reduced to 18 degrees Beaume.

The machine is a massive piece of work. It consists of a great cylinder 16 feet high and 7 feet in diameter. From the upper portion of the cylinder there extends a horizontal addition supported by stanchions and on the outside of the cylinder there are eight six-inch pipes extending the full length of the great pipe. The interior of the cylinder is filled with small pipes running from the base to the lower edge of the horizontal plane above. At that point sixty-four of the little pipes are deflected and carried under the suspended plane. These sixty-four pipes are practically flues, utilized to carry the evaporating heat to the material to be treated. The plant is said to be able to take care of 200 tons of cane juice per day, and to reduce it to such a condition that it can readily be converted into sugar.—Coffee and Sugar.

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PRESIDENTS OF THE HAWAIIAN SUGAR PLANTERS' ASSOCIATION FOR 21 YEARS—1882 TO 1902.

Samuel N. Castle, 1882.
Col. Z. S. Spalding, 1883.
Jonathan Austin, 1884.
Sanford B. Dole, 1885, 6.
Henry P. Baldwin, 1887-8 and 1899.
Alexander Young, 1889, 90, 91 and 92.
William G. Irwin, 1893, 4 and 1902.
F. A. Schaefer, 1895, 1901.
Francis M. Swanzy, 1896.
John F. Hackfeld, 1897.
Joseph B. Atherton, 1898.
Chas. M. Cooke, 1900.

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Trans-Pacific and 'round-the-world traffic is rapidly increasing and getting quite common on American railroads. An agent of the New York Central recently issued, in one week, nine round trip tickets to a party going to the Hawaiian Islands. Sales are frequently made to Yokohama and to Hong Kong and to other Chinese ports. Business to Australia is also growing.—Four-Track News.

CONTRACTS.—As practically every transaction in business is a contract, whether expressed or implied, written or verbal, it would seem of utmost importance that a merchant should be well grounded in the law governing contracts, and familiar with the essential parts of a contract. The first requisite is that the agreement between the contracting parties be clearly understood and concisely stated. It is presumed by law that

a written contract means neither more nor less than what is stated; hence parole or verbal evidence is not allowed in court to change or disprove any portion of it. The next feature of a contract is the consideration. It is an ancient and well-established rule of the common law prevailing in this country that no promise can be enforced at law unless it rests upon a consideration, by which word is meant a cause or reason for the promise. There are two exceptions to this rule. One is when the promise is made by a sealed instrument or deed. Here the law is said to imply a consideration—that is, that it does not require any consideration should be proved. The second exception relates to negotiable paper in respect to the rights and duties of endorsers thereto. Another feature is that of a place where a contract becomes operative. It is made when both parties agree to it, and, therefore, when both agree to it, if they are at the same place, the laws of the State in which the contract is to be executed apply to it. As, for instance. a note made in one State and payable in another, bears the legal interest prevailing in the latter State. Time is also an element of a contract, and its limitations should be clearly defined.—Am. Grocer.

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BRUSSELS' SUGAR BOUNTY CONFERENCE.

The following gives the text of the Sugar Conference, as adopted:

"Article 1.—The high contracting parties agree, from the date of putting in force this present convention, to do away with bounties, direct or indirect, according to the production and exportation of sugars, and not to establish bounties of this kind while the said convention shall be in existence. This agreement shall apply to sugar and sugar products used in manufacture, such as confectionary, chocolate, biscuits, condensed milk and all other analogous products.

"Article 2.—The high contracting parties agree to submit to bonded warehouse rules under the permanent supervision of employees of the Treasury, manufactories and sugar refineries as well as factories in which sugar is extracted from molasses.

"Article 3.—The high contracting parties agree to limit the excess charges to a maximum of 6f. per 100 kilograms ($1.20 per 220 pounds) for refined sugar and sugars similar to refined sugar, and of 5f. 50c. ($1.10) for other sugars; that is to say, the difference between the duties or taxes to which foreign sugars are subject, and of the duties or taxes to which home grown sugars are subject.

"Retaliatory Duty.—Article 4.—The high contracting parties agree to lay a special duty upon the importation into their territory of native sugars of countries which give a bounty for production or exportation, the said parties each

reserving the right to prohibit the importation of sugars which are accorded bounties.

"Article 5.—The high contracting parties agree, reciprocally, to admit at the lowest rate of their importation tariff native sugars, whether from the contracting States or from the colonies or possessions of the States which do not give bounties to which the obligations of Article 8 would apply. Cane and beet sugar shall not have imposed upon them differing rates.

"Article 6.—Spain, Italy and Sweden are relieved from the obligations of the provisions of Article 1, 2 and 3, as long as they do not export sugar.

"Article 7.—A permanent commission, having headquarters at Brussels, shall be charged with carrying out the agreement of this convention, the first meeting to take place in Brussels, at the convenience of the Belgian government, three months or less before putting in effect the agreement of this convention.

"Article 8.—The high contracting parties agree for themselves and their colonies or possessions—an exception being made for the autonomous colonies of Great Britain and of the British East Indies—to take the measures necessary to prevent bounty sugars, which have traversed the territory of a contracting State, from enjoying the advantages of this convention in the market of destination.

"Article 9.—The States which have not taken part in this convention will be permitted to agree to it upon request and upon agreeing to conform to the rules of the permanent commission.

"Five-Year Term Fixed.—Article 10.—The articles of this convention shall take effect from September 1, 1903, and shall be in force for five years from that date, and will continue in force during one year thereafter, and so on for terms of five years in case no State denounces the convention twelve months before the expiration of the five-year period.

"Article 11.—The provisions of the convention shall apply to the provinces and colonies beyond seas and foreign possessions of the high contracting parties. There are excepted, however, the colonies and possessions of Great Britain and the Netherlands save in what is set forth according to the provisions of articles 5 and 8.

"Article 12.—This convention shall be ratified at Brussels on February 1, 1903.

"Final protocal, considered as forming part of the convention, added to Article 11.—The governments of Great Britain and the Netherlands declare that no bounty direct or indirect shall be accorded to sugars of their colonies during the existence of the convention, and that no preference shall be given in their respective countries to colonial sugars as against foreign sugars."—Willett & Gray's Circular.

CUBAN SUGAR.—The Republicans of the House of Representatives have finally agreed on the question of Cuban Reciprocity. A number of Republicans opposed the proposition of the Ways and Means Committee on the ground that the giving of relief to Cuba would be at the expense of the Republican principle of protection. Representative Long, of the Ways and Means Committee, made a forcible speech in advocacy of the committee's proposal to grant Cuba a 20 per cent concession and argued that the maintenance of a protective tariff was not involved, but that the policy of reciprocity was. He insisted that conclusive evidence had been given in the hearings before the Ways and Means Committee showing that concessions made on Cuban sugar would not effect the price of sugar in this country and that the beet sugar industry would not be injured. A reduction of 20 per cent, leaving the duty at $1.34 per 100 lbs. would not enable the Cubans, after paying freight rates and cost of refining, to compete with beet sugar in Chicago, Kansas City or Denver, which are the principal markets for its sale. He espoused reciprocity with Cuba, not only because it would be helpful to Cuba, but because he believed we would get an adequate return and contended that, in addition to self interest, there was a moral obligation upon the United States to grant concessions. In conclusion Mr. Long said:

"If this legislation fails, and no concession be made to Cuba—if the policy of President McKinley and President Roosevelt be defeated by this House—it does not mean that the beet sugar industry, by the control of this House, can prevent the free importation of sugar from Cuba.

"After the establishment of the republic of Cuba a treaty can be negotiated with that country by the President. That treaty can provide for the annexation of Cuba, as a recent treaty did for the annexation of the Danish West Indies; and that treaty can be submitted to the Senate and ratified.

"The moment that the ratifications are exchanged, under the decisions of the Supreme Court in the Puerto Rican case, we would have free trade with Cuba on all products. The House would be powerless to prevent it.

"So this House is not supreme and it does not control or dominate this situation. It would be the part of wisdom for the beet sugar interests to agree to a reasonable concession what would not injure their industry in the remotest degree, rather than to be compelled to accept possible annexation in the immediate future.

"Annexation will come in the not far distant future, but when it does come, I want it to come by the free act of the Cuban people, and when they come permanently under our flag, I do not want them to feel they were the victims of forcible annexation, which President McKinley characterized as criminal aggression."

NEW PROCESS OF REFINING WITHOUT ANIMAL CHARCOAL.

By Sigmund Stein, Manager, Suger Refinery, Liverpool.

Having received many enquiries of late regarding this process, the writer is induced to give a few more details on the subject than were given in previous numbers of this Journal. It may be stated that the principles involved are pretty well known, and in the following lines will be found some more details, so as to enable those interested in the matter to form their own opinion.

The process is entirely chemical and it achieves exactly the same result as the earlier existing processes with animal charcoal. The lowest kind of cane sugar with a polarication of 70 upwards can be treated and very white crystals, cubes, granulated, and superior "Golden Syrup" can be made thereby.

The cost is but one-third to one-half that of the old charcoal process. Of course the expenses and cost of refining depend to a large extent on the locality of the factory, the cost of labor, carriage of chemicals, &c.

The chemicals used can be easily procured in any part of the world or can even be manufactured by the refiners themselves. It is not necessary that a trained chemist should supervise the work.

As is known great difficulties are encountered by sugar manufacturers in the tropics in getting trained chemists who are capable of acting as managers of their works, but as the principles of this process are here laid down clearly I don't think these gentlemen would have any difficulty in executing same.

In this process there are four operations:—

I.—The Melting and Application of Chemicals.—This is done with a system of steampipes and provision for the application of compressed air. This pan must be so arranged that the chemicals which are employed can be economically and efficiently used. The raw sugar is thrown into this melting pan, dissolved with hot water, and brought to a temperature of 180-190° Fahr. The concentration of the sugar solution should not be higher than 26-27° Baumé at the temperature mentioned. The acidity of the sugar solution is taken and noted, and on this acidity the addition of the chemicals depends.

After the boiling is finished and the sugar properly dissolved by means of steam and compressed air, either peroxide or hydrogen, phosphate of alumina, or phosphoric acid, tannic acid or a tannic compound, calcined magnesia or another magnesia compound, are added.

Of course the addition of these chemicals and the mode of applying them has been the subject of tests on my part during the last 15 years and it is evident that the quantity and mode of application depends on the character of the raw sugar melted.

After the aforesaid chemicals have been added there will be a small froth formed on the surface which has to be taken off by means of a perforated ladle, after which sulphate of alumina is added.

It may be stated that all these chemicals are brought into the melting pan in solution or in a dissolved or suspended state at a certain degree of concentration and care must be taken that not more than a certain quantity of chemicals are added.

After the addition of sulphate of alumina, compressed air is again forced through the liquid and another froth containing the gummy and pectine matters forms on the surface of the solution. This second froth must be taken off very carefully. Steam is again applied to keep the temperature at 190° Fahr. The solution so prepared in the melting pan is passed on to the next stage—filtration.

II.—FILTRATION.—This can be done either through Taylor filter-bags, filter-presses, or sand-filters. Care must be taken that only perfectly clear liquor comes out of the filtering apparatus. It is of the utmost importance to keep this filtration stage under efficient supervision. The clear solution running off from the filtering apparatus is treated now in the third stage.

III.½BOILING.—For the purpose of boiling, high vacuum pans are used, provided with a stirring arrangement, fitted inside if possible.

Regarding the material employed in the construction of the pans, I may state in answer to repeated inquiries that iron vacuums will do quite as well as copper, as the acidity is so slight that it will not affect the iron.

The boiling takes place in the case of low sugars (such as Jagary, Java stroops, Muscovados, Peru syrups, Argentine syrups, Mexican syrups, Philippine syrups, Taal, Manila, Mauritius, or Egyptian syrups), at a temperature not higher than 135-137°, and the pressure should be about 10 to 12 lbs., and the vacuum proper about 27-28in. The boiling must be done very carefully, and all false grain prevented. It is necessary to seed the vacuum with crystals from a former strike, so as to allow large crystals to form. The sugar thus boiled is ready for the fourth stage.

IV.—CENTRIFUGALLING.—The massecuite running off from the vacuum pans is passed into large mixers, and from thence to the centrifugalling machines. Any centrifugal machine will do for this purpose, but of course the newer type are preferable. It should be a quick running machine with an

arrangement for steam. The massecuite should not be too stiff, and the load in the centrifugal must not be too heavy. The massecuite is placed in a running centrifugal machine, the green syrup is machined off, and steam is applied for a few minutes, after which the operation is finished, and white and dry crystals result, which are ready for packing. The crystals resulting from this process are equal to those made by the older process with animal charcoal.

From the foregoing descriptive lines it will be seen that no great mechanical changes are necessary to enable existing refineries to adopt this process. The expenditure for mechanical appliances is practically nil or very small indeed, and the only outlay will be for chemicals, and everyone interested in this process can easily calculate for himself their cost, as only a very small quantity is required to prevent inversion or deterioration of the sugar.

Of course in the tropics, where these chemicals are not to be had, the cost of carriage from Europe has to be taken into account. Peroxide of hydrogen can be made in the factory itself from peroxide of barium and sulphuric acid, a process which is so simple that any manufacturer can do it himself.

The witer is firmly of opinion that this process, on being properly tried, with be found a perfectly rational one, and well suited for working every kind of sugar, as any deterioration or inversion of the sugar is excluded.

To give an idea as to the cost of refining for non-European manufactories it may be mentioned that in England the working expenses would be 3d. per cwt. of sugar.

The off-running syrups from the centrifugal machines are sent back into the melting pan and mixed with raw sugar, and again treated with chemicals, so that practically only white crystals result.

I have had many inquiries from India, Argentina, Brazil, Mexico, Peru, &c., where manufacturers are anxious to make sugar for consumption without any great outlay. To them this process is unhesitatingly recommended as a simple and eminently practical method. But it is of the utmost importance to stick implicitly to the directions given, and to follow them out exactly with regard to their execution.

Of course if cubes are desired, the crystals can easily be dissolved again, and worked according to the known and existing cubes processes, or ready crystals can be pressed into cubes. Powdered sugar, icing sugar, and the like may be made from the crystals resulting from this process.

I think this process is especially adapted for use in India, where the religion of the natives forbids the use of animal charcoal, and is the only one, refiners can adopt for the production of sugar convenient to the Indian market. In every country which has the advantage of manufacturing sugar for

consumption from raw sugar, this process will enable the manufacturers to derive the greatest benefit in working.

It is impossible to give here any more details, but I think that the information supplied above should go far to answer the numerous direct and indirect inquiries on the subject.—Int. Sugar Journal.

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Sawdust in cake form as fuel has been produced in Prussia. These are octagon-shaped bricks, 6½ inches long, 3½ inches wide, and three-fourths of an inch thick; weight, one-half pound each. In the district and surrounding towns where the factory was located, the schools were heated by this fuel, which burns in air-tight stoves without a large flame, and leaves but little ash. It is an ideal fuel, being clean, and no regulating of the stove being necessary. No binding ingredient is used; the sawdust is dried and pressed in the shape of the briquette. The absence of all tarry or oily substances prevents smoke. The weight of such a briquette indicates the heavy pressure under which it takes its shape, and the edges look like polished oak; in fact, it is heavier than a piece of hard wood of the same size. The demand created by the popularity of this fuel exceeded the supply of sawdust obtainable in the vicinity of the factory, so shiploads were procured from Sweden and carloads from distant manufactories. Sawdust, which previously could be had for the asking, demanded a market price as soon as it became known that a certain factory could make use of it.—Consular Reports.

Census figures on population show that migration from the Atlantic to the Central States is decreasing, while migration from the Atlantic States to the Western States is increasing. The returns show that the foreign-born population of New York State includes 1,229,158 from Europe, of whom 275,102 are from Ireland, 322,343 from Germany, 145,433 from Italy, and 155,201 from Russia. There are 6,077 Chinese, 311 Japanese, 1,401 Turks, and 1,175 other Asiatics. There are 32,873 Poles, 31,516 Hungarians, 15,055 Bohemians, 10,499 Roumanians, 1,491 Spaniards, 14,755 French, 1,221 Belgians, 2,608 Dutch (Holland), 28,320 Swedes, 5,621 Danes, 21,924 Canadians, and 71,427 Austrians. A most decided mixture.—U. S. Consular Reports.

The cultivation of sugar forms the principal agricultural industry in Fiji. The area of land under cultivation is estimated at 19,376 acres, with a yield of over 280,000 tons of cane. The labor is largely carried out by Indian coolies. The Colonial Sugar Refining Co., of Sydney, have three mills at work, and a fourth in process of erection.

The reason why there is no color or race line drawn in Ha-

waii is because the white settlers were missionaries who accepted the Christian doctrine on the subject, and were anxious to put the natives on the same plane as themselves. They maintained the native ranks of queens and chiefs, with the wealth attached. Then came the Chinese, Japanese and negroes, and all were accepted according to their ability, culture and wealth, and all have equal *entree* in the best society, and Anglo-Saxons make no objection. Indeed the wealthy Ah Fong daughters have nearly all been sought in marriage by American or English husbands.—N. Y. Independent.

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CANE CUTTING MACHINERY IN AUSTRALIA.

In the report furnished by Dr. Maxwell to the Federal Government in reference to the sugar industry, allusion is made to a mechanical device for the cutting of cane, which allusion has excited much interest among the Queensland sugar growers. Dr. Maxwell stated that the author of this contrivance is now in the United States of America, seeking facilities for the making, perfecting, and testing of his device. On inquiry we learn that the gentleman in question is Mr. Herbert Paul, who, some months ago, went to America with a patent which covered certain ideas he had formed, as a practical man interested in cane-growing on one of our northern rivers. From information just received from Washington, there is every hope that the object which has so long engaged the serious attention of sugar growers has been carried into effect. We understand that the invention consists of two parts—namely, the motive power, which is pneumatic, and a suitable machine containing a cutter, to which a reciprocating motion is imparted, and which may be operated whilst held in the hand. The leading pneumatic tool company in America very soon produced what was regarded as a perfect apparatus for the motion required, but the difficulty arose in deciding the kind of knife, or cutter, which should be attached to it. Mr. Paul referred the problem to Disston's, the well known saw and knife manufacturers, and a quantity of sugar cane was operated upon for purposes of experiment. A knife, with teeth like a saw, was tried, as also a circular saw, but both proved utterly useless for the work to be done. The reasons for this were:—(1) The power required to hold the knife against the cane to be cut. (2) The extra weight of the machine itself for imparting the rotary motion. (3) The blunting of the saw by cutting the cane and coming in contact with the earth. (4) The extra power required to operate it (the rotary motion). (5) The skill, labor and time required to sharpen the toothed cutter. One of the experts who conducted the experiments reported: "The reciprocating and rotary cutter with teeth saw is a failure." The upshot was that, after several trials with the saw principle, it was discarded by the experts as

valueless. Under these circumstances, the experts and Mr. Paul thought out a form of tool in the shape of a cutter without teeth, having a reciprocating motion of between 500 and 1,000 strokes a minute. This was found to cut the cane at the rate of about two seconds per stick. The operator simply holds the instrument in his hand, and applies the cutter to the foot of the cane stalk, cutting cleanly through the cane and any leaves or debris, level with the ground. It is considered by experts that such a cutter leaves the root stalk in a far better condition for ratooning than is the case with hand cutting, and there is no waste of the best part of the cane, as is often found in rapid or careless hand cutting. The physical labor involved is said to be very slight, and the whole of the power is supplied by the machine, the part held by the operator weighing not more than six pounds. An air-compressing engine of suitable type will be supplied, capable of feeding two pneumatic tools, so that two men can be engaged simultaneously cutting, or one can be cutting and the other topping cane, for one machine is adapted to both operations, topping to be effected after or before the cane is on the ground. It is impossible to estimate with any accuracy what the saving will be, but it is believed that with this new combined apparatus, one man will be able to cut four times as much in a given time, as with an ordinary cane knife. It is also thought that as skilled labor this work will be more acceptable to Europeans, and far less exhausting than under present conditions. Mr. Paul has also devised and patented an apparatus for conveying the cane from the field to the trucks on the main tramline, which, it is estimated, will effect a saving of two-thirds of the labor at present required for this part of the operation. It need hardly be added that these devices have been protected by patents. Mr. Paul hopes to return to Queensland early next month with his machine perfected, and to give a demonstration of its work, probably in the cane fields near Bundaberg.—Brisbane Courier.

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AN OPEN LETTER TO SUGAR PLANTERS.

DEAR SIRS:—My connection with these Islands, which has extended over a period of thirty years, being now about to be severed in deference to the wishes of the House of Bishops in the United States, I crave permission to address you on a subject which appears to me to have a very close and intimate bearing upon the prosperity of your plantations, and with them upon the prosperity of the Islands.

I am fully aware that the subject matter of this letter will be regarded by many as having no bearing whatever upon the profits of your estates, but being myself firmly persuaded on this point, I should fail in my duty were I to leave the Islands

without submitting the matter to your consideration, whether you accept or reject what I now proceed to lay before you.

The subject of this letter is the practice that has been adopted in recent years of keeping the mills grinding and trains running on Saturday, and having everything again in motion the moment midnight on Sunday is past.

It is perfectly true that by this arrangement there is apparently a cessation of labor for a seventh of the week, but only apparently, for though your machinery has twenty-four hours rest, your engineers, sugar boilers and others who attend on your machinery are only able to secure a fraction of that period of rest. They are thus deprived of a God-given period of rest which the human constitution requires, and this deprivation diminishes the value of their work, and so reduces the profits which you expect to obtain by that very deprivation.

On the relation of the institution of a seventh-day rest to the human constitution, let me quote the following passage from the writings of one who has made a study of the obligations of the Lord's Day:

Now it is certain from the constitution of human nature, which is God's handiwork, and from practical experience, that man is not capable of enduring incessant secular toil, and that he needs periodical respite from it and requires spiritual refreshment, if he is not to degenerate physically, mentally and morally. But although it is evident from natural reason and experience that some stated portion of time ought to be set apart for the worship of God, and for the concerns of eternity, and for the welfare of our souls and bodies, it does not appear evident, from reason or experience, what that portion ought to be. And here Revelation comes to our aid; it tells us of work and repose. The day immediately following the six days of creation was set apart, or consecrated, as the Sabbath, so called as signifying rest, that is, cessation of action up to that time.

The distribution of the work over six days, followed by the repose on the seventh, was to infix this grand principle in the mind of every human being that after six days labor one day of rest should follow. God worked in a certain order that man might work in the same, and God rested at a certain time that man might rest likewise.

"We learn also," says Bishop Wilson, "from this order of creation, that man was made not for constant and unrelieved employment, or for earthly pursuits chiefly, but for labor with intervals of repose, and in subordination to the glory of God. Man was formed not for seven days' toil, but for six—man was formed not for terrestrial pursuits merely, but for the high purpose of honoring God, meditating on His works, and preparing for the enjoyment of Him forever. The essential nature of the institution obviously lies in the proportion of

time fixed by his beneficent and all-wise Creator—for his body six days' labor, for his soul one day of religious rest; and this corresponds with his compound nature—his intellectual and moral part calling him up to the exalted and delightful offices of religion; this bodily and animal part requiring recreation and repose. The Sabbath is the spiritual badge and charter of man."—(The Lord's Day, by the Rev. Morris Fuller, pp. 299-300.)

The practical experience of those who labor is in full accord with the principles laid down in the above passage as belonging to the moral government of the world. A friend of mine who has had opportunity of ascertaining how your system is regarded by your employes writes to me:

"From chemists, sugar boilers and engineers in four, I might say in five, different mills, I have it that the present system would be much improved by closing the mill every Saturday at 12 o'clock (noon). Men strong and vigorous coming into the mill are seen gradually to fall off, able to produce less work than formerly, necessitating an increase in the number of hands to keep up the weekly output of sugar or to suffer in the output a marked falling off. One sugar boiler of many years' experience and certainly a first-class man in his line, told me that he is ready to prove that with a stipulated number of hands they can put out more sugar in six months, if they close at 12 noon on Saturday, instead of at midnight as at present, and to reopen at 6 a. m. Monday instead of at 12 mid. The closing at noon on Saturday, which is observed, I believe, in all factories, etc., in England, allowing from 4 to 6 hours for pans to cool, would enable the men to do all cleaning by midnight, and feel that they have one day of rest before them."

If the testimony here given of loss of vigor sustained by your servants through the encroachment on their God-given right by the system now in vogue on your plantations does not appeal to you on the grounds of justice and humanity to alter your system, it should appeal to you on the grounds of self-interest, to prove whether the keeping of your human interests in their full energy and vigor will not more than compensate for a curtailment of the present hours of labor.

So far I have viewed the question on the side of the rights of mankind. But there is another side on which much might be written. I have spoken of the Lord's Day rest as a God-given right. If I am justified in so calling it, it is because the seventh-day rest having been instituted by God, not by man, it follows that whilst on the one hand the Fourth Commandment gives to capital a Divine sanction for the employment of labor, it gives no such sanction for its employment on the seventh, but on the contrary, is the laborer's charter of rest from toil on the seventh day. This being so, it should need no argument to satisfy all who believe in God's moral govern-

ment of the world that a system which infringes human rights that rest on a Divine sanction cannot but be displeasing to Him in whom we live and move and have our being. One purpose for which He has given us the Sacred Scriptures is in order that we may see in His dealings with the chosen race how nations and individuals enjoy prosperity or suffer adversity, according as they are obedient or disobedient to His laws. The seventy years' captivity of the Jews may be traced, among other causes, to their neglect of the Sabbatical institution in their anxiety to make money. Nothing in this world happens by chance, and in the fires that last year threatened the plantations of Hamakua, and destroyed miles of forest, one must be blind who does not read a warning that wealth obtained by means displeasing to the Ruler of the universe may be scattered in a moment.

On the ground of the duty every man owes to God, and no less of respect of the rights of man resting on Divine sanction, I plead with you to conduct your mills on a system agreeable to religion and the rights of humanity.

Let me conclude with the following remarkable passage which sums up the advantages of a due regard of the sacred day of rest:

"The day of holy rest to a land bearing the Christian name, and to a republic based on equal rights, has the highest civil worth. Man needs it physically, as a season when labor may wipe off its grime and breathe more freely after the week's exhaustion, and when care shall slacken its hold upon the frame and the heart. Man needs it morally, to rise by its aid out of the engrossing secularities and materialism to the remembrance of his spiritual interests, his final account and his eternal destiny. Toil needs it, to rescue its share of rest and its season of devotion from the absorbing despotism of capital; and Capital needs it, to shield its own accumulations from the recklessness and anarchy of an embruted and desperate proletariate, and to keep its own humanity and conscientiousness alive. The State needs it, as a safeguard of public order, quiet and virtue; human laws becoming, however wise in form, effete in practice, except as they are based on conscience, and upon the sanction of eternity, as recognized voluntarily by an intelligent people, and God's day cultivating the one and reminding us of the other."—W. R. Williams, D.D.

I am, dear sirs, yours very faithfully,

ALFRED WILLIS.
Late of St. Andrew's Church.

P. S.—Since the above was written, a sugar boiler on the Island of Oahu, desirous to receive the rite of Confirmation, was invited to be in the Cathedral for that purpose on Palm

Sunday. He replied that he was unable to do so, having to work every Sunday during the grinding season.—Honolulu Diocesan Magazine.

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FERTILIZING HAWAIIAN RICE SOILS.

By J. T. Crawley.

Very little work has been done either here or in other countries to determine the most suitable fertilizers for rice. Many of the Hawaiian rice soils are old, and the yield is decreasing. Add to this the enormous quantities of rice that are being produced in Louisiana and Texas, and at a minimum of cost, and the increase in cost of living and of labor in Hawaii, and it will be seen that every effort must be made to increase our yield per acre in order to offset these disadvantages.

The rice planters are awakening to this fact, and in my capacity as superintendent of the Hawaiian Fertilizer Company of Honolulu, I am often asked to advise and supply a fertilizer suitable for growing rice. Much work has been done on the cane soils, and the yield of sugar has increased materially, owing, among other things to a more scientific use of fertilizers. The following work was undertaken with the belief that the same methods of investigation applied to rice soils will give an insight into the plant-food, requirements of this crop, and enable the land to produce much larger yields.

Present Methods.—Very little fertilizer is now applied to rice lands, and that in a desultory manner, without a knowledge of the underlying principles. Most of the rice land is in the hands of the Chinese, and they have adopted and still use the methods of their forefathers in planting, cultivating and harvesting. The Chinese are a very conservative people, and love the old ways, customs and usages, and are not given to making new experiments nor adopting new ideas. The racial habit that has made the Chinese an unchanging people, has caused them to adopt methods of cultivation that were probably in use in China centuries ago. They have tried methods of polishing. Some, when they see their fields decreasing in yield, go to the hill sides, dig out the surface soil, pack it in baskets, and scatter it broadcast over the rice fields. Others either import a kind of bean cake from China, or shrimp meal from California. This shrimp meal is very much like an ordinary fish scrap, one sample of which gave the following results:

Shrimp Meal.—Ammonia, 7.7 per cent.; phosphoric acid, 4.4 per cent. It is applied at the rate of two or three hundred pounds per acre, either before planting and just before harrowing, when the land is covered with water, or to the young growing rice. In the latter case it is scattered broadcast in the water. The water is kept running over the field until the

crop reaches the stage when it is usually taken off. Now this organic material must be changed by so-called nitrifying organisms into other compounds before the plant can take it up. This process does not readily go on under water, hence it would seem that the immediate crop would derive very little benefit from the fertilizer. Indeed this is the experience of many rice planters, as well as some planters of taro, a plant cultivated in water very much as is rice. The crop following the one to which the fertilizer is applied gets more benefit from the application than the immediate crop. In the interval between the two crops, the land is allowed to lie fallow, and plowed, thus allowing the sun and air to get in and promote the action of the nitrifying bacteria.

Prof. W. C. Stubbs makes some valuable suggestions along this line in Bulletin No. 69, 2d series, page 396, of the Louisiana Experiment Station, as follows: "All cultivated crops utilize the nitrogen required in the form of nitrates, and there are abundantly formed in every fertile soil by the process of nitrification, the work of microscopic organisms. Both the organism involved and the conditions under which they perform the work of the conversion of the organic nitrogen into nitrates, have been frequently and thoroughly studied. One of these conditions requires drainage or removal of excess of water which destroys or drowns the microbes. Therefore, the process of nitrification cannot take place in an inundated field, and the application of fertilizers containing organic nitrogen, such as cotton seed meal, tankage, dried blood, stable manure, etc., early in January, with occasional subsequent cultivation with disc or other harrows, until the rice is planted in May, would accomplish their conversion into nitrates. During this time the fields should be thoroughly drained, &c."

This method of application is partly applicable here, but as two crops per year are taken off, the land cannot lie fallow very long at a time, and can be plowed but very little.

In some cases we have recommended the application of fertilizers at the time of plowing, in which case the ammonia can be from an organic source; and in other cases, as soon as the rice is say six inches high. The fertilizer here used is a high-grade soluble fertilizer, part of the nitrogen as nitrate of soda, the phosphoric acid as soluble acid phosphate, and the potash from high-frade sulfate of potash. This is scattered over the field at the rate of 400 or 500 lbs. per acre, and the water then allowed to dry up. In this way the fertilizers sink down into the soil around the roots of the plant, just where it is needed, and all except the nitrate of soda is fixed with the soil, and is in no further danger of washing out. In no case should this soluble fertilizer be applied to the rice while water is running off from the field, as in that case much of the valuable constituents would be dissolved and carried away by the water. We have seen cases where planters applied a

soluble fertilizer in running water, and wondered why it did not show any effects on the crop.

FERTILIZER REQUIREMENTS.—In order to determine the fertilizer requirements of rice, samples of the whole straw, containing the rice heads were taken, the butts of the straw cut off and the rice and hulls separated from the straw. The Chinese cut the rice with a small hand sickle near the ground, and then cut off the butts to act as a kind of ground covering for the upper parts to rest upon. In harvesting, the top part of the straw and the rice are taken from the field, while the butts are burned in place. From the sample taken, the following represents the production in pounds per acre:

Butts of straw	6,835.5 lbs.
Heads of straw	2,646.0 "
Rice and hulls	3,748.5 "
Total	13,230.0 "

Following are analyses for the different parts:

	Nitrogen.	Phosphoric Acid.	Potash.	Total Ash.
	Per cent.	Per cent.	Per cent.	Per cent.
Butts	.164	.07	1.93	13.31
Heads	.203	.136	.97	21.10
Rice and Straw.	.565	.356	.53	6.0

The nitrogen and phosphoric acid increases from the bottom upwards, while the potash decreases in the same way the amounts of the several ingredients removed per acre are:

	Nitrogen.	Phosphoric Acid.	Potash.
	lbs.	lbs.	lbs.
Butts	11.2	4.7	131.9
Heads	5.4	3.6	25.6
Rice and hulls	21.2	13.3	19.9
Total	37.8	21.6	177.4

In other words from one acre of the soil from which this sample was collected there was required for the growing crop 37.8 lbs. nitrogen, 21.6 lbs. phosphoric acid, and 177.4 lbs. potash. Of course a part of the potash and phosphoric acid is returned to the soil in the ashes, but the above will show the general needs of the crop.

CHEMICAL COMPOSITION OF RICE SOILS.—The following were selected as typical soils:

1.—Soil from Ah Chuck's place, Wailua, Kauai.

2. Soil from Chong Wo Wai, Waipaa, Hanalei, Kauai. An old soil, in cultivation probably 20 years.

3.—Mun Sing Co., upper Hanalei, Kauai.

4.—Kwong Sing Wai, 109-acre field, upper Hanalei, Kauai.

5.—Nam Chong, Hanapepe, Kauai.

6.—Waiahole, Oahu, Mr. T. F. Lansing.

7.—Hyman Bros.

8.—Shin, Palama, Honolulu, Oahu.
9. Sing Loy, Waikiki, Honolulu, Oahu.

ANALYSIS OF RICE SOILS.

	Lime (Cao.)	Potash.	Nitrogen.	Phosphoric Acid.
1	.86	.12	.17	.33
2	4.08	.139	.14	.186
3	.09	.108	.193	.245
4	.97	.197	.161	.308
5	.56	.237	.225	.239
6	.18	.20	.10	.187
7	.25	.16	.22	.204
8	1.04	....	.088	.679
9	.549	....	.114	.469

With but two exceptions these soils are sufficiently high in lime, and in most cases the phosphoric acid content is satisfactory. On the other hand, the potash and nitrogen are quite low in most cases, comparing these with other Hawaiian soils. No attempt has been made to determine the availability of the lime, phosphoric acid and potash in these soils, but considering the fact that most of the time they are under water, and subjected to the constant leaching effect of running water, one would naturally expect them to be very low in available elements. Most of these soils are old, having been in constant cultivation for a great many years, and it is not to be wondered at that they are giving out. The total amount of plant food extracted from the soil by one crop, with the exception of potash is rather small, but the Hawaiian rice planters raise two crops of rice a year, and continue this process year after year with no rest for the soil. In view of the foregoing analyses and considerations, I am now advising a fertilizer higher in potash than that heretofore used, and have no doubt but the change will give good results. This is also borne out by the observation that the rice is usually much longer when piles of straw have been burned. The chief ingredient of the lower part of the straw, as is seen by the analyses, is potash, and this stimulates the rice in those places where the straw has been burned.

In the foregoing no account has been taken of the elements added to the land by the water, and no attempt has been made to have a fertilizer recommendation on the exact proportions removed by the crop thereon, so many other factors, such as elements added to the soil by water elements taken from the soil by water, etc., that such an attempt would be fanciful. Fish scrap contains but nitrogen and phosphoric acid, and a manuring of this leaves out of account the one element, potash, that is so abundantly abstracted from the soil. Moreover it is not in a condition to furnish at once its nitrogen to the plant, but must wait until the water is taken off, and the sun and air have a chance to effect the necessary chemical changes.

GERMAN SUGAR PRODUCTION AND THE CARTEL.

(U. S. Consular Report.)

The general feeling of uncertainty and anxiety about the future of the beet-sugar industry in Europe—some allusion to which was made in a report of this series dated the 14th of October, 1901, seems to grow more acute with the progress of the season's campaign.

The latest official estimate shows that, exclusive of Denmark, the sugar-growing countries of Europe will produce this year 5,928,150 tons of raw sugar, an increase of 262,850 tons over the already enormous product of last year. Of this vast output, Germany will, it is estimated, yield 2,073,100 tons, against 1,974,800 tons during the last preceding campaign.

On the 7th of December, a high commercial authority estimated the visible supply of raw sugar now in the principal European markets at 1,640,813 tons, against 1,297,525 tons on the same date in 1900 and 1,249,772 tons in 1899. Adding to these the visible stock of raw sugars in the United States and Cuba on the 4th of December, there is found to be in sight 1,825,921 tons, against 1,407,783 tons on the same date last year and 1,554,790 tons in 1899.

Under these conditions and in view of the growing production of sugar in the United States, Cuba, Porto Rico, and Hawaii, prices of raw sugar in the German market have sunk until the condition of the whole producing interest would be desperate were it not for the "cartel," or secret working combination between raw-sugar factories and refineries, by which high prices are maintained for all sugar consumed in Germany, the profits from which, added to the Government bounty paid on exports, enable the factories to pay a proportionately high rate for beets and at the same time sell their exported product in foreign markets at prices with which other nations find it difficult to compete, and which in effect give the German product a commanding position in the world's sugar market.

The cartel, or syndicate of sugar producers and refiners, about which much speculation, more or less inaccurate, has been published recently in the English newspapers, was organized something more than a year ago, and, according to a statement which appeared at that time, includes about 95 per cent of the sugar-producing interests in Germany. Its management is secret and somewhat difficult to study, except through the medium of results, but in general terms it may be stated that the cartel guarantees producers of raw sugar a certain minimum price and takes their entire product. Any difference between this minimum and a lower price which may rule in the world's markets is made up by the refiners. On the other hand, the raw-sugar producers guarantee to pay

a fixed minimum price for beets, to produce no raw sugar for consumption in Germany, and to sell their raw sugar only to refineries belonging to the syndicate. Among the results of this clever scheme two may be cited which will explain the present situation, viz: On the one hand, the factories are able to pay for beets about 75 cents per ton more than the general sugar market price outside of Germany would justify, and, on the other, refineries are able to control absolutely the price of sugar for consumption in Germany, and this they do so effectively that ordinary white lump sugar costs today at any grocery store in Berlin 30 to 35 pfennigs (7½ to 8¾ cents) per pound, or nearly three times what is charged for the same grade of German-made sugar in London, and this at a moment when Germany has just harvested the largest beet-sugar crop in her history and when industrial depression and diminished wages render high prices for any food material especially burdensome to the people.

So oppressive have become the exactions of the cartel that the Associated German Chocolate Manufacturers took steps early in September this year to organize at Genthin, in Brandenburg, a scheme for the erection of a factory capable of working up daily 15,000 centners of beets, the product of which is to be used in their business. This break for independence by a union of heavy consumers of sugar has caused some agitation on the part of the cartel, whose organ warns the chocolate makers of the results of such insubordination; but, according to definite press reports, the latter have gone on making ten-year contracts for beets with the farmers of a large region, and will have their factory and refinery in readiness for the campaign of next year.

Meanwhile, several meetings have been held to discuss plans for reducing the area of beet culture and to consider what will be the effect on German sugar interests should the pending international conference at Brussels vote to abolish export bounties, a result which no one familiar with the situation expects to be realized any more than it was in 1898. France then refused to give up her bounty system, and, it is thought, will this year be sustained by Russia in opposing any serious change in existing laws.

Equally unpromising is the outlook for any important and systematic reduction in the area of beet culture next year. The simple fact is that under the management of the cartel farmers receive for their beets a price considerably higher than is justified by the value of sugar in the world's markets, and consequently sugar beets are about the only crop left to German farmers that is largely profitable. While they will meet and talk and adopt resolutions against overproduction, they are aware that any action which they may take to that end will be abortive for Germany unless France, Russia, and Austria-Hungary, to say nothing of Belgium, Holland, and Sweden, will join in the agreement, and this they

have manifested no disposition to do. The public press reports are probably correct when they describe the proceedings at the meetings for reduction of area as showing that every beet farmer and factory manager seems anxious to persuade everyone else to restrict his area of beet culture for next year, but has no serious intention to do so himself.

Meanwhile, the principal lesson which American sugar growers have left to study in this country is the intelligent utilization of the two principal waste products of beet-sugar manufacture—the spent pulp and the crude molasses—which latter contains usually from 40 to 50 per cent of sugar that can not be crystallized out on account of the potash salts which the crude syrup contains.

In the early years of German beet culture the utilization of these secondary products attracted relatively small attention. Agricultural science was busy with the task of improving the quality of the beet itself, increasing the percentage of saccharine elements in the pulp, and augmenting the yield of beets per hectare. It was soon discovered that the spent pulp from the sugar factories was a most valuable food for cattle; that by drying, it could be preserved for use throughout the winter; and that by adding to the dried pulp the waste molasses, the feed was not only rendered more palatable for animals, but, being fed on the farm, the potash of the sirup was retained on the premises and restored to the land in the form of stable leachings and manure.

For a number of years waste beet molasses in this country was either exported to France or Spain or was used here as a raw material for the manufacture of alcohol, the potash salts being in that case recovered and restored to the land as a separate chemical fertilizer. But the internal-revenue laws of Germany are so shaped as to favor the production of alcohol on a large scale and at a small cost from potatoes, so that the spirit manufacture from beet molasses was gradually abandoned and the waste sirup used for feed. Germany is a country with limited grazing facilities; vast quantities of corn are imported as food for animals, and every kind of nutriment for cattle, horses, or swine is costly, when compared with the prices of similar materials in the United States. For this reason, principally, the home production of meat in this country is, and will probably remain, far behind the needs of the people. Spent beet pulp enriched with waste molasses helped, therefore, to meet a pressing want, and the crude sirup is now worth for this purpose 4.75 to 4.80 marks ($1.13 to $1.14) per 100 kilograms (220 pounds) in carload lots.

That similar conditions will obtain in the United States, where pasture, hay, corn, and all forms of food for animals are abundant and cheap, is hardly probable. But the beet-sugar producers in our country should start out with the idea that nothing that comes from the land should be wasted or prevented from sooner or later returning to it. It may be

long before the rich virgin soil of American beet farms will be reduced to the condition of the worn fields of Europe, where the strictest balance must be maintained between the chemical elements harvested in a crop and returned to it by skillful rotation of cultures and scientific fertilization. But our country has as yet no native potash minerals, and if our growing beet-sugar industry is to make the most of its advantages and opportunities, it can not afford to neglect the scientific methods which have been found most effective in Europe in conserving to the utmost practical degree the strength and vitality of the soil.

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LIST OF VERNACULAR AND PROPER NAMES OF PLANTS.

Continued from February Number.

GORDONIA Anomala.—Tropical and sub-tropical Asia. A rather small ornamental tree, with cream colored showy flowers. Seeds Botanical Gardens, Hong Kong, China, 1895 and 1900.

GRASSES.—At various times numerous grass seeds were forwarded and of this the following are of most importance.

PANICUM Spectabile.—The "Coapin" of Angola. From West Africa, transferred to many other tropical countries. A rather succulent, very fattening grass, famed not only in its native land, but also long since in Brazil. The wonder of all beholders in Fiji, strangling by its running roots almost everything in its course; at its original starting point forming a mass of the richest green foliage over six feet high, gradually lowering to the outer border, where a net work of shoots or runners cover the ground; it roots at the joints and sends up then a mass of the softest and most luscious fodder. In Fiji it runs over the soil at the rate of ten feet in three months; readily propagated by pieces of the procumbent stem, which roots freely at each joint. Plants of this grass have been sent to Hawaii; it is planted at the upper part of Nuuanu Valley; I have taken it up on Tantalus, and at the American Colony at Wahiawa; although it has been rather dry Mr. Thomas reports a growth of nine feet and six inches in six weeks, or about one and a half inch per day. The Hilo grass has been introduced into the Fiji Islands, and there, as here, has proven a great disappointment; the Coapsin will run all over and continually strangle the same. On the Rewa River, with the moist atmosphere, this grass runs all over the bushes; it covers the garden fences when left alone, and here, high above, seeds were obtained. Unfortunately it is somewhat of a nuisance, on the sugar plantations, completely covering the water ditches in a comparatively short space of time. As the Hilo grass with us,

it cannot be expected to grow luxuriant on the lower dry plains, yet will keep to the same localities as this.

Seeds from Rewa River, Fiji, Nov., 1899.

PANICUM Maximum.—The Guinea Grass. Tropical Africa. This perrenial grass attains a height of eight feet. It is highly nutritious. In Jamaica it is the principal fodder grass up to elevations of 5,000 feet, springing up over wide tracts of country almost to the exclusion of everything else. It forms large bunches, which when cut young supply a particularly sweet and tender hay; throws out numerous stolons; can be mown every six weeks. A favorite grass in tropical countries for stall fodder. The best fodder grass raised on the plains of India. Will (exceptionally) grow six inches in a day. It is necessary to guard against over feeding with this grass solely. Succeeds even in poor clay soil and sea sand. Seeds from the late Dr. Bancroft at Brisbane, 1894.

PASRALUM Virgatum. L. (?)—Mexico. Perennial; of excellent quality as fodder; has extraordinary drought resistance; keeps green during the hottest summer time. Seeds at Cuantla, Morelos, Mexico, during 1897. Also several other species growing in a meadow with the foregoing. P. DILATATUM, with similar qualities. Botanical Gardens, Sydney, N. S. W., Jan., 1900.

GUAVA Psidium Guayava, Linne.—Seeds of the best Mexican varieties. From Orizaba, Mexico, 1899.

GUAZUMA Tomentosa.—India and America. According to Mr. Fayden, it grows in Jamaica, to a height of twenty to twenty-five feet, and is allowed to grow on pasture lands, not only for the sake of its shade, but the cattle feed and thrive on the foliage and fruit. The latter, coarsely bruised, are given to horses as a substitute for corn, the nutritive qualities being attributed to the mucilage which abounds in them, and also in the inner bark. This mucilage is given out abundantly on infusion or decoction in water, and according to the same authority, has been employed as a substitute for gelatine or albumen, in clarifying cane juice in the manufacture of sugar. The timber is light, splits readily, and is employed for the staves of sugar hogsheads. Reference is made to this tree, and notes quoted from the fact that we have several large trees in Honolulu, both at the Government Nursery and Thomas Square; it may be made useful as a tree in pastures if nothing else.

HELICONIA Versicola.—Ornamental plant. From the Botanical Gardens at Suva, Fiji, Nov., 1899.

HIBISCUS Rasa Sinensis.—Our common red single flowering Hibiscus. Seeds of same from Ceylon, Feb., 1900.

HIBISCUS Sp.—Seeds from Queensland, Australia, Jan., 1900. Flowers rose colored with dark center.

HIBISCUS Sp.—From plant at Hong Kong, China, Feb., 1900; flowers not observed.

HOYA CARNOSA.—Wax flower. Seeds at Suva, Fiji, Nov., 1899.

HURA Crepitans.—Sand-box tree. Seeds at Botanical Gardens, Suva, Fiji, 1899. One of these trees is growing at the Government Nursery.

IMBRICARIA Coriacea.—A handsome small tree, with large deep green glossy leaves, fruit the size of CALOPHYLLUM, on long stem, yellow and many seeded. A few seeds from Botanical Gardens, Suva, Fiji, Nov., 1899.

INDIAN CURRY LEAF. Murraya Koenigii.—A tree growing under the above name at Botanical Gardens, Suva, Fiji, with very fragrant leaves. Said to be used in preparing curry in India. Seeds Nov., 1899.

IPOMOEA Chrysantha.—The yellow Ipomoea. Seeds at Botanical Gardens, Hong Kong, China, 1895; from this it is spread all over Honolulu. Again from Suva, Fiji, 1899.

IPOMOEA Sp.—Flowers very large and pure white; on sea shore, Suva, Fiji, where seeds were collected during Nov., 1899.

IPOMOEA Sp.—Flowers small, white. Suva, Fiji, Nov., 1899.

IXORA.—Cuttings of two varieties of this ornamental plant. Botanical Gardens, Suva, Fiji, 1899.

IXORA Stricta.—Seeds at Hong Kong, China, February, 1900.

JASMIMUM Grandiflorum.—Seeds at Hong Kong, China, February, 1900.

JATROPHA Podagrica.—A handsome ornamental plant, with orange red flowers. Seeds at Suva, Fiji, Nov., 1899.

JINIQUIL. HYMENAEA COURBARIL.—Tropical and Southern sub-tropical America. A tree of colossal size and remarkable longevity. Timber hard, extremely heavy, close grained, used for select wheel work, treenails, beams and planks. Also in various machinery. Courbaril wood exceeds the British oak four times in elasticity, and nearly three times in resistance to fracture. A fragrant amber like resin, known as West Indian copal, exudes from the stem. The Mexican trade name of the resin is "Coapinole." The beans of the pod are lodged in a mealy pulp of honey like taste, which can be used for food; they are sold at nearly all the markets in Mexico. This is one of the Algaroba trees. Seeds at Orizaba and Cuantla, Mexico, 1897. A very desirable tree for the Hawaiian Islands.

JUBAEA Spectabiles.—The tall and stout Coquito Palm of Chili. A kind of treacle is obtained from this palm. A good tree will give ninety gallons of Mellaginous sap. The small kernels are edible. Stem reaching a height of sixty feet; leaves sometimes ten feet long, (F. V. M.) Seeds from Australia, Jan., 1900.

KENTIA Aurea.—I give the name as found at Botanical

Gardens, Suva, Fiji, where seeds had been obtained, Nov., 1899. A very graceful palm with finely pinnated leaves, not unlike COCOS PLUMOSA; stem slender about twelve feet in height.

KENTIA Macarthurii.—PTYCHOSPERMA MACARTHURII as it ought to be named, a very elegant and distinct palm, from New Guinea. Large numbers of seeds at the Botanical Gardens, Suva, Fiji, Nov., 1899.

KENTIA Belmoreana.—2000 seeds from Sydney, N. S. W., Jan., 1900.

KENTIA Canterburiana.—1,000 seeds from Sydney, N. S. W., Jan., 1900.

KENTIA Forsteriana.—2,000 seeds, also from Sydney, Jan., 1900. Kentias are the handsomest and most elegant palms for decorative purposes.

KIGELIA Pinnata.—Sacred tree of Nubia. A large tree of this is growing at the Queen's Hospital grounds to the right of the entrance.

KNIGHTIA Excelsa.—The Rewa-Rewa of New Zealand. The wood of this tree is recommended as valuable for ornamental work, and furniture. Seeds at Auckland, N. Z., December, 1899.

LAGERSTROEMIA Flos-reginae.—Bloodwood of India. Forming a magnificent timber tree, yielding a blood red colored wood, which, though open in the grain and soft, is greatly used in India for boat building, and for the knees of ships on account of its great durability under water. We have seen it grown largely along roads at Colombo, where it looks very handsome when in flower. Flowers are of a beautiful rose color in the morning, growing deeper through the day, until they become purple in the evening; large, from two to three inches in diameter, in large terminal panicles, often as numerous as to almost cover the top of the tree, and forming one mass of flowers. Seeds from Botanical Gardens, Suva, Fiji, Nov., 1899.

LATANIA Commersonii.—Seeds from Australia, January, 1900.

LICUALA Grandis.—Seeds of this elegant small palm were obtained at Botanical Gardens at Suva, Fiji, Nov., 1899, and from Queensland Acclimatization Society, Jan., 1900.

LEGUMINOSAE.—Seeds of several species of Leguminous trees were collected at Fiji, and Hong Kong, China, 1899 and 1900.

LICUALA Horrida.—One large tree of this at present in Mrs. Jaeger's yard; the only plant saved from a lot of seeds received from Singapore by King Kalakaua.

LICUALA MUELLERI.—Northern Queensland. Growing plentiful near the Coast on the Johnston River, amongst the forest. One of the grandest of all palms. Specimens were seen fully seventy-five feet in height, with large, firm and en-

tire fan shaped leaves. Differs from its congeners by its large size; nearly all the Lecuala are dwarf plants. Seeds from Queensland Acclimatization Society, Jan., 1900.

LIGUSTRUM Sinensis.—A handsome flowering shrub. Seeds at Brisbane, Queensland, October, 1899.

LINOCIERA (Chionanthus) Ramiflora.—Queensland. Seeds from Acclimatization Society, Jan., 1900.

LOPHOSTEMON Australis.—Likely, TRISTANIA CONFERTA, N. S. W., and Queensland. A noble shade tree, attaining a height of 180 feet. It is not only elegible as an avenue tree, but also as producing select timber; ribs of vessels from this tree have lasted unimpaired thirty years and more. (F. V. M.) Seeds from Australia 1899, and Hong Kong, where it is growing nicely on the dry hills at Cowloong, Feb., 1900.

MACROZAMIA Denisonii.—Southern Queensland. Ornamental plant. Seeds from Acclimatization Society of Queensland, Jan., 1900.

MALVA Sp. N.—Paraguay, South America. Seeds from Orizaba, Mexico, 1898. Several other species of Malva seeds were collected in Mexico, 1897; one of these is flowering in Honolulu; large golden yellow flowers with dark brown center.

MALVA Sp. (Abutilon).—Ornamental compact shrub, dark red flowers. Seeds at New Caledonia, Oct., 1899.

MALVA Sp.—Flowers yellow. In dense forest on Rewa River, Fiji, Nov., 1899.

MALVACEOUS SHRUB.—New Caledonia. Ten feet in height; leaves large; flowers in umbels, not seen. In cultivation.

MANDERIN ORANGE Citrus Nobilis.—Seeds of the best varieties grown in Mexico, from Orizaba, 1899.

MANGO Mangifera Indica.—The famous "Mango de Manila" of Mexico, young trees from Orizaba, Mexico, 1898. Seeds of a common variety grown at Suva, Fiji, and a rare fruit of the same growing to enormous sizes, often ten inches in length. Both these are growing in Honolulu now.

MARANTA Calathea.—Several species of this ornamental plant from Suva, Fiji, 1899.

MARTINETIA Caryotaefolia.—New Grenada. An interesting Caryota leaved palm; stem, peticles, and back of leaves densely clothed with long black spines. Seeds at Ceylon, Feb., 1900.

METCALF BEAN.—Seeds from Queensland Acclimatization Society, Jan., 1900.

METROSIDEROS (Syncarpia) Leptopetalis.—N. S. W. and seeds from same Society, Jan., 1900.

MICHELIA Champaca.—India. It is cultivated commonly for the powerful fragrance of its flowers, which indeed is so

strong that bees seldom if ever alight on them. Seeds at Peradeniya Gardens, Ceylon, 1894.

MINA Lobata.—A beautiful ornamental, twining herbaceous plant. Amongst a lot of seeds from Orizaba, Mexico, 1899.

MOLLINEDIA Pupescens.—Peru. A handsome flowering shrub. Seeds at Sydney, N. S. W., Jan., 1900.

MORINDA (Citrifolia?).—The "Noni" of Hawaiians. Unusual large fruits were seen at Suva, Fiji, and seeds of same collected, Nov., 1899.

MUSA Sp.—A wild Banana growing in mountains near Levuca, Fiji; fruit one inch long; three seeded Oct., 1899. Some eleven varieties of Banana plants sent from Orizaba, Mexico, 1898, all growing in Honolulu.

MYRISTICA Laurifolia.—Seeds at Kandy, Ceylon, Jan., 1900. This is the wild Nutmeg.

MYROSPERMUM Pareira.—Central America. Yields the drug known as the Balsam of Peru. Seeds from trees growing on Lake at Kandy, Ceylon, Feb., 1900.

MANCHE Spondias lutea.—Vernacular name of tree producing an astringent fruit in Mexico; both these and the leaves are used medicinally. Fruit on market at City of Mexico, not much esteemed. Seeds at Oaxaca, Mexico, 1897.

NEPHELIUM Litchi.—Through the kindness of directors of the Botanical Gardens at Hong Kong, two varieties of this fruit tree were obtained from Canton, during 1898; the so-called "Mai-tschi," the ordinary fruit, and "Nomai-tschi" the best of all Litchies; a large fruit with hardly any, or only small seeds.

NEPHELIUM Pinnatum.—Fiji Island. A large tree said to produce an excellent fruit. Young trees at Suva, Nov., 1899.

NEPHELIUM Teiocarpum.—From Botanical Gardens, Sydney, N. S. W., Jan., 1900.

NYMPHEA Gigantea.—North Queensland. This handsome water lily will grow to ten inches in diameter in water six to eight feet deep. Seeds at Cairns, Queensland, 1894.

OLEA Sp. (O. Lanceolata).—Likely this New Zealand tree, largely planted in parks at Sydney, N. S. W., where seeds have been obtained, Oct., 1899.

ONCOSPERMA Horridus.—Tropical Asia. A handsome palm, slender spiny trunk, 25 to 35 feet in height. Seeds from Queensland, Jan., 1900.

ORNAMENTAL CLIMBER.—In the mountain forests in Fiji, a large woody climber was found with resemes of showy red flowers on joints about one foot apart, all up the woody stem. An extremely curious and showy plant. Cuttings and seeds of same Nov., 1899. On a former visit to these Islands, in a dense forest, a woody climber was met with of about three inches in diameter, having similar resemes of flowers

but much larger and light rose colored, beginning some four feet from the ground, some eight inches apart, all the way up until lost in the branches of trees; the woody leafless stem was a mass of flowers, a sight never to be forgotten.

Seeds of various other ornamental plants, shrubs and trees were collected and forwarded during the last few years of which no names could be obtained.

PALMS.—The late Mr. Jaeger, who took so much interest, and for many years a leading part in the introduction of new plants, compiled a list of Palms present on the Islands, containing about sixty species. Since then the number has greatly increased, notwithstanding many of the species had disappeared from the islands.

Seeds of some forty varieties were obtained at the Botanical Gardens at Peradeniya, Ceylon, Jan., 1895, many of them new to the islands; twenty-two varieties were received from the Botanical Gardens at Buitenzorg, Java; five species of unnamed palms seeds were received from Uraguay, S. America; and in all my travels, wherever possible, I collected them.

In a list kindly sent to me by Dr. Treub, of Buitenzorg, to select from, I find over 150 palms not yet represented on these islands.

With a little knowledge of the habits and requirements of this plant, we shall be able to succeed in raising the greater part of the 1200 or more known species. One, and one of the most important facts regarding the culture of Palms, should be borne in mind, in planting the base of the uppermost roots should be level with the soil, never should the stem be buried as is so often the case to the detriment of the plant. In the Fiji Islands, three species of unknown palms were obtained, one of these from the Botanical Gardens, surpassing even that grand VERSCHAFFELTIA SPLENDIDA, of which we have but a single specimen growing in Mrs. Jaeger's garden. The other two were found in the mountains of Ovalau and Vitu Levu, closely related to PTYCHOSPERMIA, so numerous here, with very slender ringed stems and pinnate leaves.

PAPAYA Carica Papaya.—The giant Papaya, so commonly seen already. Seeds at Kandy, Ceylon, January, 1895.

PARMENTIERA Cereifera.—Central America. This so-called Candle Tree. Its fruits often four feet long, have quite the appearance of yellow wax candles, and a person entering the forest, which are composed of this tree, almost fancies himself in a chandeliers shop, for from all the stems and older branches these fruits are suspended. Seeds from Botanical Gardens, Peradeniya, Ceylon, Jan., 1900.

PASSIFLORA Quadrangularis.—Likely the above species of large Grenadilla. Seeds at Suva, Fiji, Nov., 1899.

PASSIFLORA Sp.—Seeds of two species, said to be new, from the mountains of Paraguay. One of these with blue

flowers, the second with flowers of red, white, blue and yellow. Seeds from Orizaba, Mexico, 1899.

PHOENIX Dactilifera.—PHOENIX Reclinata. Seeds from Australia, Jan., 1900. PHOENIX Sp. Seeds from Botanical Gardens, Brisbane, Jan., 1900.

PHYSALIS Franchiti.—Red Cape Gooseberry. A fruit and accrescent calix bright orange red. Seeds from the Queensland Acclimatization Society, Jan., 1900.

PHYSIANTHUS Albens.—Brazil. Climbing plant; also known as the Cruel Plant, from the fact that many insects, in their attempts to get nectar from the fragrant flowers, are held by the proboscis and perish. I have had this plant in my garden at Alameda, Cal., from where seeds have been brought, for some ten years past; the value as an insect destroyer ascribed to the same is far over estimated. In fact it had been recommended as destructive to the Codlin Moth, which is an impossibility. Cut Worm Moths, it is claimed are destroyed by the same, which is not the case, or very exceptional. Plusia, are often found suspended from these flowers, so is an occasional small butterfly, and even bees.

PINANGA KUHLII.—Malay Archipelago. A nice palm. Seeds at Botanical Gardens, Suva, Fiji, Nov., 1899.

PINANGA Maculata.—Philippine Islands. Very ornamental palm with small irregular dark green spots upon leaves. Seeds at Suva, Fiji, Nov., 1899. Should have a light shaded damp place to attain its full beauty.

PINUS Massoniana (P. Sinensis).—China. A good sized pine, with widely spreading ramifications. The wood is durable, and, when well seasoned, is much employed for tea boxes. This is the tree so largely planted to cover the almost barren rocky island at Victoria, and the dry hills at Cowloong opposite Hong Kong. It should do well on this island at higher altitudes. A large quantity of seeds were given to me by Mr. Chas. Ford, Director of the Botanical Gardens, at Hong Kong, Feb., 1900.

PITTOSPORUM Crassifolium.—New Zealand. Largely planted in gardens and parks at Auckland, as an ornamental bush. It will grow on rocks and in sandy places direct on the seashore, where it is washed by the spray. Seeds from Auckland, N. Z., Nov., 1899.

POTOCARPUS Ferruginea.—The Miro of New Zealand. Its timber excels all New Zealand pines in strength. It is straight and even in grain, compact, hard and elastic. For marine piles it is of high value, as it is not readily attacked by teredo. Specimens used for marine piles in Southland, known to have been driven from twelve to twenty-seven years, were still sound and good. Many seeds collected from trees at Auckland, N. Z., Dec., 1899.

POTOCARPUS Totara.—With the exception of the Kauri, the totara is said to afford the most valuable timber in New

Zealand. The wood is of a deep red color, varying considerably in depth of tint. It is clean, straight in the grain, compact, and of great durability, it does not warp or twist and is easily worked; in the latter respect it does not equal California Redwood, but it is superior to that timber in strength and probably in durability also. It is an excellent timber for general building purposes and is of great value for bridges, wharves and other constructive work, where large spans are not required. No other timber exhibits equal power to resist the destructive teredo; it surpasses the West Australian jarrah, from which great results were anticipated and is only excelled by the costly greenheart of Demerara. The chief aspect of totara is its somewhat brittle character; specimens loaded up to their full strength break suddenly and without warning; ordinary fence posts, after standing a few years, often become extremely brittle, although remaining perfectly sound. The tree occurs in great abundance in the center of the North Island of New Zealand. Seeds from Auckland, Dec., 1899.

PRITCHARDIA Pacifica.—Fiji, Samoa and Tonga Islands. Closely related to the Hawaiian P. GAUDICHAUDI, the "Loulu lelo" of the natives. Many seeds at Levuca, Fiji, Nov., 1899.

PSYCHOTRIA Repens.—China. A climbing plant, good for covering rocks, walls, etc. Seeds at Hong Kong, Feb., 1900.

PTEROCARPUS Indicus.—Burmese Rosewood. Seeds from an immense large tree at Botanical Gardens at Peradeniya, Ceylon, 1894. Met with this tree again at Pennang, where it is the principal shade tree in that city, as well as in Singapore, from where seeds were collected; it is covered all over by orchids. It seems readily propagated by simply taking part of branches, two to four inches in diameter, and about six feet in length, and planting them on places where trees are wanted. This tree is growing superbly in Honolulu.

PTYCHOSPERMA Alexandrae.—ARCHONTOPHOENIX ALEXANDRAE, N. E. Australia. Seeds of a tree recembling this at the old Botanical Gardens, Suva, Fiji, Nov., 1899.

PTYCHOSPERMA Alba.—Seeds from the Botanical Gardens, Suva, Fiji, Nov., 1899.

PTYCHOSPERMA Normanbyanum.—Tropical Australia. Seeds from Queensland Acclimatization Society, Jan., 1900.

PTYCHOSPERMA Filamentosa.—A Palm, so named at the Botanical Gardens at Suva, Fiji. Here and there along the Rewa River this palm shows its top above the forest trees.

A group of these were found near Nausori, growing in a dense forest; the large egg shaped red seeds are only produced on plants when the light above the trees is reached and clusters of the same can be seen on stems seventy-five feet in height. Large numbers of seeds were amongst the

damp leaves on the ground where they sprout and produce young plants if not eaten by rats which seem to devour the greatest part. Nov., 1899.

QUERCUS Salicifolia.—Hong Kong. A very handsome evergreen oak. Likely to grow well on the Islands, as does the California Live Oak, QUERCUS AGRIFOLIA, of which two young trees at least are in Honolulu. Attempts should be made of growing some of the Southern Oaks, and especially the Cork Oak, QUERCUS SUBER, of Southern Europe and North Africa. Seeds at Hong Kong, China, Feb., 1900.

RHAPHIOLEPIS Indica.—An evergreen flowering shrub. Seeds from New South Wales, Australia, Oct., 1899.

RICINUS Rosea.—An ornamental, red leaved, castor oil plant. Seeds Botanical Gardens, Suva, Fiji, Nov., 1899.

SABAL Princeps.—Seeds from Australia, 1899.

SALVIA Chian.—Mexico. From Dr. G. Eisen of San Francisco, Cal. One teaspoonful of these seeds in a glass of water said to produce a cooling drink; largely used in fevers.

SANTALUM Acuminatum.

SANTALUM Pericarium.—Seeds of same at Adelaide, S. A., 1894.

SAPINDUS Sp.—Fiji. A large tree; seeds obtained at Suva, Nov., 1899. A genus of nine species, of which one is found in the Hawaiian Islands (SAPINDUS OAHUENSIS). All contain saponine in the large cavities of the fruit flesh, a substance, which shaken with water forms a frothy detergent lather like soap, whence the name "soap tree."

SHADE TREE Cordia Sp.—From all appearances, this seems to be one of the Kou trees. Seeds at parks in Brisbane, Queensland, Jan., 1900, where it is used as a shade tree.

SCHOTIA Latifolia.—South Africa. Elephant-Hedge-Bean-Tree; seeds at Brisbane, Queensland, Sept., 1899.

SEASHORE TREES.— Under this head comes a large number of trees, seeds of which were collected at Fiji. The BARRINGTONIACEAE form a prominent figure. Several species of APOCINEAE are represented on the well clad sea coast, forming handsome large trees. Many species of LEGUMINOSAE are represented, amongst these that valuable timber tree AFZELIA BIJUGA. Amongst MALVACEAE we find there, as here, the "HAU" tree (PARITIUM TILIACEUM), and the "MILO" (THESPESIA POPULNEA). It is direct on sea shore that the CALOPHYLLUM INNOPHYLLUM grows to perfection, and produces the large quantities of oil-nuts annually exported. That pretty tree the "KOU," (CORDIA SUBCORDATA) also grows to perfection where its roots get the daily sprays from the incoming tide The FICUS also seems to thrive on the seashore, as seen from specimens near Levuca. Aside from the important Mangrove trees, numerous other plants, climbers and trees are found to clothe the sea coast of the South Sea Islands, in fact

where man has not yet brought in his "civilization" it is all a continuous dense forest from the sea shore to the highest mountain peaks. Such has been the condition of our own Islands a hundred or so of years ago, and if the present conditions remain another hundred years, or even in less time the Hawaiian slands will be a desolate waste.

SCHINUS Molle.—From Mexico to Chili. A tree thriving on dry and sandy soil, odorous in all its parts; the foliage in bouquets a good substitute for ferns, and does not shivel quickly. Will bear droughts better than almost any other plant. A splendid tree to cōver the barren sides of Punchbowl. Seeds from Mexico, 1897.

SOLANACEOUS PLANT Datura Sp.—Ornamental plant Flowers violet, large, double. Seeds from Suva, Fiji, Nov. 1899.

SPONDIAS Pleiogama.—Seeds from the Queensland Acclimatization Society, Jan., 1900.

STERCULIA Bidwillii.—Australia. A small ornamental shrub. Seeds from N. S. W., Australia, Jan., 1900.

STERCULIA Lurida.—New South Wales Sycamore Tree. Seeds from Sydney, Jan., 1900.

STILLINGIA Sebifera.—The Tallow-Tree of China. The seeds are thickly coated with a fatty substance which yields the tallow so extensively used in China for candle making. Its wood is valuable, being used by the Chinese for printing blocks; its leaves are employed for dyeing black. Seeds at Hong Kong, Feb., 1900.

STRELITZIA Augusta.—The handsomest and largest of the species; twelve to fifteen feet in height. Not unlike a Traveller's Palm. Seeds at Orizaba, Mexico, 1898.

SYNCARPIA Laurifolia.—The Turpentine Tree of N. S. W., and Queensland; attains a height of two hundred feet with a stem to thirty feet in girth; rather of quick growth; well adapted to shade road sides. The wood is very durable, mostly used for flooring and cabinet making, as it takes a high polish. Within the last decade the timber of this tree has become very highly esteemed for piles in sea water; as it is claimed it even surpasses the far famed "Yarrah," EUCALYPTUS MARGINATA, in its durability and almost entire exemption from attacks of the teredo.

Mr. J. H. Maiden, Curator of the Techological Museum Sydney, on "Notes on some New South Wales Timbers," May 16th, 1889, remarks upon this tree, "The well known Turpentine Tree," socalled because it exudes an oleo-resin from the fruits and also from the trunk, when wounded or ringed, or better still sawn into logs. It extends throughout the coast district from the Tweed to the Ulladulla District, arriving at its greatest luxuriance in deep gullies containing good soil, in which situation it is also found well into the mountains. It grows straight with a magnificent bole, if the circum-

stances be favorable. Probably, owing to the oleo-resin contained in it, it is both durable underground and invaluable for piles in sea water as the teredo rarely attacks it. Most of the piles in Port Jackson are of this timber, and for wharves along the Coast it has been brought largely into requisition. It is also used for ship building; when employed for uprights in buildings, it is said to be liable to warp, if much exposed. It is an excellent wood for railway sleepers, rails, etc., and posts of it have stood for twenty years and more. A recommendation of this timber is the difficulty of burning it. (Exp. Warren).

I have collected large numbers of seeds in New South Wales, during 1894. Specimens of this tree were present previous to this. We have seen several trees at Kukuihaele, Hawaii, fifty feet or more in height, and perfectly straight, some two years since; and nice specimens can be seen at Tantalus Forest. The tree should attain a minimum girth or at least six feet before being used.

SYRINGA Sp.—A handsome shade tree twenty to twenty-five feet in height largely grown on streets and in parks of Mexico, where it is known under the vernacular name of "Trueno." Will make a fairly good hedge plant. Seeds in Mexico, 1897 and 1898.

SYRINGA Sp.—A small leaved large shrub with white flowers. Botanical Gardens, Suva, Fiji. Cuttings Nov., 1899.

TAXICOPHAEA Thunbergii.—South Africa. An ornamental flowering shrub. Seeds from New South Wales, Australia, 1899.

TAXODIUM Mucronatum.—The famed "Montezuma Cypress" of Mexico. An evergreen tree growing to one hundred and twenty feet in height, with a trunk reaching one hundred feet in circumference, at Chapultepec, where several grand avenues have been planted. Large numbers of these trees can be seen growing in river beds on the road to Pazcuaro. Closely related to Virginia Swamp, or Bald Cypress, with deciduous foliage. The wood is fine grained, hard, strong, light, elastic and very durable; splits well; it is much used for shingles, rails, cabinet work and planks; it is almost indestructible in water. In conversation with a railroad engineer, while traveling in Mexico, I was told that railway sleepers of this timber will last thirty years and more, and are not attacked by termites. The tree requires good soil, a well sheltered site, with much moisture, but also good drainage. Useful for avenues, on swampy margins of lakes or river banks. Aside from its valuable timber, it is a noble tree with its pale green feathery drooping foliage. Seeds at Chapultepec, Mexico, 1897. Many trees from these can be seen in Honolulu and elsewhere; a large number have been planted in Nuuanu Valley, and it thrives exceedingly well in all localities but suffers if exposed to trade winds.

TEA Hybrid of Assam.—One-half bushel of seeds at Ceylon 1895.

TABERNAEMONTANA Dichotoma.—Ceylon. A tree belonging to the APOCYNACEAE. Seeds from Ceylon, 1900.

TECTONIA Grandis.—The "TEAK" of South Asia. Teakwood is held in the highest esteem by ship builders for the backing of ironclad man-of-war; preferred to any other wood; also used for the panels of coaches, and for various other select purposes unsurpassed. It scarcely shrinks. Seeds at Ceylon, 1895 and 1900. A large tree in old Hildebrand Garden is bearing seeds.

TEJOCHOTE.—Vernacular name of a species of CRATAEGUS in Mexico, where the small spiny tree bears enormous quantities of fruits used for making a superior preserve. Seeds in Mexico, 1897.

TERMINALIA Arjuna.—India. A large tree sixty to eighty feet in height. Seeds at Brisbane, Queensland, Jan., 1900.

TERMINALIA Belerica.—India. The astringent fruits of several species of this genus have been employed for tanning and dyeing purposes by the natives of India, and are now brought to Europe in considerable quantities, under the name of "Myrobalans," and used chiefly by calico printers for the production of a permanent black. TERMINALIA BELERICA is one of the principal trees furnishing these seeds. Ceylon, Feb., 1900.

TERMINALIA Catapa.—The "Kamani" of the Hawaiian Islands. Enormous numbers of seeds are washed ashore along the beach at Fiji Islands, where the tree principally grows. Large numbers of the same sent here, Nov., 1899. A tree much planted for the shade afforded by its horizontal branches and large leaves, less on account of the almond like edible fruit. The seeds have a taste of almonds and as these are eaten; the bark is used in tanning and will produce a black color.

TERMINALIA Sp.—Fiji. A very handsome tree growing on sea shore in Fiji; of comparatively small dimensions, and rather small seeds, the kernel of which is eaten. Levuca Fiji, Nov., 1899.

TERMINALIA Sp.—In Park of South Brisbane, Queensland, a small, pretty shade tree, about fifteen feet in height, with pubescent leaves; the horizontal branches spreading about twenty feet. Could be recommended for the treeless sidewalks of Honolulu, with POINCIANA REGIA, as keeping below the wires, a matter that requires consideration by the authorities. It is the smallest of the species that I am acquainted with.

TERMINALIA Sp.—Fiji. Growing on sea shore. A tree with lanceolata leaves dark green, glabrous above, silvery on under side; only small specimens seen; apparently hard timber. Seeds from Suva, Nov., 1899.

TERMINALIA Sp. (Latifolia).—Botanical Gardens, Brisbane. A tree with very large leaves. Some twenty seeds of same, Jan., 1900.

TERMINALIA Sp.—Botanical Gardens at Peradeniya, Ceylon. A very large tree. A number of seeds, Feb., 1900.

TIGRIDIA Pavonia.—Mexico. Peacock Tiger Flower. A pretty Liliaceous plant, growing well in Honolulu. Seeds at Orizaba, Mexico, 1897.

TRIPHASIA Trifoliata.—Southern China. The Manila "Lime-berry." An evergreen spiny shrub, with sweet scented white flowers. Its fruits are about as large as hazel nuts, and have a red skin. When ripe they have an agreeable sweet taste, and are sometimes preserved whole in syrup. It will make an admirable hedge plant. Seeds at Botanical Gardens Suva, Fiji, Nov., 1899.

UNKNOWN TREE.—Likely South Sea Islands. A handsome large leaved tree in Park at Newmea, New Caledonia, where a number of seeds were obtained Oct., 1899. One tree is growing at the Hon. Mr. Damon's place.

VANGUERIA Edulis.—Warmer regions of Africa and Madagascar. Yielding an esculent rather small fruit, known as "Voa-vanga." Seeds at Botanical Gardens, Suva, Fiji, Nov., 1899.

VAVAO.—Vernacular name of a large tree belonging to the APOCINACEAE, on sea shore, Fiji. The thin fleshy pulp of the large fruit has an agreeable flavor. Seeds at Suva, Nov., 1899.

VICTORIA REGIA.—Seeds from Germany 1898. From the Queensland Acclimatization Society, Jan., 1900. No success was had with these seeds on either occasion.

VITEX Litoralis.—The "Puriri" of New Zealand. A noble tree forty to sixty feet in height. The wood is dark brown, excessively hard, dense and heavy, of great strength and durability, but as a rule difficult to work on account of the interlaced and crossed arrangements of the fibres. It is the strongest and most durable of all the New Zealand timbers. It is extensively used for house blocks, piles, railway sleepers, culverts, bridges, and constructive work generally, whenever it can be obtained; also for ship's blocks, machine beds and bearings, and for purposes requiring great strength and durability. It is the best timber in New Zealand for fence posts, etc. Aged trees are difficult of conversion; younger trees split more readily, but it is unusually necessary to employ blasting powder or dynamite. The Puriri is of great value for ornamental planting; many trees can be seen in the parks at Auckland. It may be propagated by seeds or cuttings, and is of the easiest cultivation. Seeds from Auckland, N. Z., Dec., 1899.

WILLEMETIA CAPENSIS.—Africa. An ornamental flowering shrub. Seeds at Brisbane, Queensland, Jan., 1900.

WILD FIJIAN TREE.—Abundance of yellow fruits the size of a walnut; said not to be eatable. Suva, Nov., 1899.

ZAPOTE BORRACHO O' AMARILLO.—The yellow Sapota of Mexico; likely identical with the West Indian LACUMA MAMMOSUM. A large tree bearing fruit of delicious flavor; if eaten in large quantities it produces sleep; has many medicinal qualities and is used for various complaints.

ZAPOTE BLANCO. CASIMIROA EDULIS. The white Sapota of Mexico. Fruit about the size of a large apple, of a greenish yellow color when ripe, and having a delicious melting flavor, like that of a peach. In Mexico where the fruit is highly esteemed, the peeled fruit is cut in slices and left in water a time before eating. According to Seeman, it produces sleep and is unwholesome and the seeds are poisonous. Within the last few years a valuable narcotic medicine has been produced from the seeds of this fruit, which is now largely used in insane asylums on raving subjects with marked success. Seeds at Mexico, 1897.

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THE MOSQUITO MUST GO.

Nations are much given to boasting of their powerful armaments and big guns. Yet the grand mogul of the amalgamated mosquito colonies still commands the biggest and most powerful army in the world. It seems just as invincible today as it was 2,000 years ago, when Caesar fought the Gauls in hand to hand conflicts. Though in all this time the mosquito has made no advancement in the art of war, he does not need to make any, for he can still defy the armies of the world. There are sections in South America and Africa which are literally uninhabitable because he holds the fort. With the malarial swamps at his feet he still defies the world, and all the genius of civilization has not yet succeeded in dislodging him.

Of course the last enemy to be destroyed is death. But next to death comes the mosquito. There is no question as to where its sting is. It wields its deadly sword while it brings its familiar song to unwilling ears. The world might still endure in patience, but latterly it has been demonstrated that the mosquito's chief mission in life is to carry on its poisoned dart malarial germs, which science has discovered to contain the animal miscrobes of disease.

Therefore at this time the world is more than ever resolved upon the mosquito's extinction, and the man who discovers a certain means of extinction will write his name imperishably on the scroll of fame. Mr. Rockefeller has recently founded an institute of research, and considering that the most beautiful spots on the earth are still made almost unfit for habitation by the presence of mosquitoes, it could do humanity no better service than to bend its entire energies to this subject.

At present extensive experiments are being carried on for the destruction of this pest in various localities. The state authorities of New Jersey are using crude petroleum at East Orange and Trenton and noting results. In almost every case where it has been used there has followed, if report is to be believed, an immediate scarcity of mosquitoes. Liberal quantities of the crude petroleum are thrown upon the surface of stagnant pools and other breeding places of the enemy. At Hartford, Conn., the marshes and pools and meadows are sprayed with oil brought in barrels. It is found that sections of the city where existence was formerly almost impossible are now vastly relieved. Three years ago mosquitoes swarmed in one locality so that property was being deserted. They came in millions, literally covering horses, cows and other animals, in some cases actually stinging them to death. People were driven out of their own houses. After a trial of petroleum spraying for three years they are now almost dislodged, and this year, it is expected, will finish them.

It is said that mosquitoes are too tough to burn successfully, and other methods have been tried in vain. Petroleum is really the best antidote yet found, and if used persistently will cause the toughest colonies to emigrate. An attempt has been made to hypnotize the mosquito. Where this succeeds the creature, instead of boring you for more blood, will whisper gently in your ear, and his song soon becomes delightful. But if one's battery is not strong enough to hypnotize the charmer, then all one has to do is to fall back upon basic principles and declare that the pain of a mosquito bite has no existence and that it will not be even necessary to crush the pest. At any rate, several men in the Nutmeg State claim to have tried the mind cure on the mosquito, and declare they found it to work to a charm.

Seriously speaking, this matter of exterminating the mosquito assumes great importance in the light of the new bacterial science. Some recent cases of smallpox have been traced to mosquito bites. If they are the efficient cause of the spread of malaria, as was discovered in the late Spanish war, it is well that we have found it out. If Christian Science has come to us, as some Connecticut authorities assert, to banish the mosquito from the earth, or render its bite innocuous, then all will unite in singing its praises.—Boston Globe.

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VALUE OF CANNED FOOD FOR LONG VOYAGES.

The Antarctic exploring-ship "Discovery" hoisted her pennant recently, and went into full commission. The home of all the crew is now aboard, watches are regularly kept, and full naval discipline is observed. The ship's stores have been stowed, and they constitute perhaps the most remarkable department of a wonderful expedition. They are mostly in

cases and bottles, and the strictest precautions have been taken to ensure the soundness of every pound.

Thee stimated cost of the food stores was £5,000, and Mr. Edward Else—who has had charge of this department, did the same thing also for the Jackson-Harmsworth expedition, and specializes, as it were, in equipments for the North and South Poles—has kept within that amount. The result is that on an allowance of two and one-half pounds of food, including one pound of meat, per man per day, there is enough on board, in an extraordinary variety, to last the expedition about four years. The great store has taken six months to prepare and collect.

Some idea of the possibilities of the "Discovery" table d'hote when in the icy South Pole regions may be gathered from a brief summary of the contents of the larder. Taking the soups first, there are 6,000 pounds of them of assorted varieties, some concentrated in cakes and others preserved in bottles. They include maggi, muligatawny, kidney, julienne, gravy, hotch-potch, cook-a-leekie, and a few others.

There are 7,000 pounds of fish of all sorts—sardines in oil, sardines and tomatoes, fresh and salted herrings, fresh and salted cod, turbot, salmon, fresh soles, halibut, gurnet, plaice, anchovies, prawns, and so on.

Of meats of one kind and another the quantity and variety are amazing. There are 3,000 pounds of roast beef, and this, with boiled beef, corned beef, roast mutton, boiled mutton, pressed mutton, and the like aggregate to 16,000 pounds.

The beef and the mutton, with a little freshly shot penguin, will very likely form the backbone of many a dinner in the Polar regions; but there are no less than 42,000 pounds of other sorts of entrees—poultry, game, and the like. The Pole-seekers may eat their partridges on September 1 and their pheasants on October 1 with the best of us at home. These, with duck and green peas, mutton cutlets, jugged hare, veal and tomato sauce, lamb and green peas, curried fowl, and succulent tripe and onions, weigh 3,500 pounds.

There are 4,500 pounds of ham and bacon, 1,500 pounds of lunch tongues, 2,000 pounds of salted meats (such as dried minced beef, beef carbonate, and that sort of thing), 500 pounds of roast turkey and 2,500 pounds of other tinned meats, particularly chicken.

Then there is the necessary proportion of vegetables for all this meat. Stowed away are 5,000 pounds of preserved potatoes, and 3,000 pounds of beetroot, carrots, onions, spinach, cauliflower, etc., with another 3,500 pounds of tomatoes, artichokes, asparagus, peas, beans, sprouts, and so on.

As for concentrated meat foods, there are 3,000 pounds of pemmican, 300 pounds of chocolate foods, containing 15 per cent. of albumen, and about 6,000 pounds of such articles as protene. There are 5,000 bottles of assorted pickles, 1,000

bottles of assorted sauces, and 250 gallons of vinegar. Every variety of fruit is aboard—6,000 bottles, and 4,000 pounds of dried fruits, the former including rhubarb, gooseberries, cranberries, apples, raspberries, green gage and damson plums, and pineapples, and the latter apple rings, pippins, apricots, peaches, prunes, and other sorts. The Cheddar, Dutch, Gorgonzola, and Stilton cheeses weigh 6,000 pounds.

The generalities of diet are in greater quantities still. Think of 42,000 pounds of flour, of 36,000 pounds of biscuits, of 15,000 pounds of sugar, of 5,000 pounds of tea and the same of coffee, with another 3,500 pounds of cocoa and chocolate.

All the good things of the "Discovery" cannot be placed in a short list, but the following are a few essentials: 7,500 pounds of butter, 8,000 pounds of Swiss milk, 15,000 pounds of suet, 15,000 pounds of lard, 15,000 pounds of oleomargarine, 15,000 pounds of honey, 7,000 pounds of jam, 5,000 pounds of marmalade, 5,000 pounds of jellies, 2,000 pounds of currants and raisins, 2,000 pounds of salt, 240 pounds of baking powder, 150 pounds of malt, 4,000 pounds of oatmeal, 4,000 pounds of split peas, 3,300 pounds of haricot beans, 2,000 pounds of crushed oats, 2,000 pounds of pearl barley, 2,000 pounds of rice, 1,000 pounds of tapioca, 500 pounds of hominy, 300 pounds semolina, and 500 pounds blue peas.

There is also a large quantity of specially good things which are set aside as "medical comforts," and which are not to be used till required. They include thirty gallons of brandy, the same of whisky, sixty gallons of port, and forty gallons of sherry.

These are backed up with 100 pounds of real turtle soup, 200 pounds of mutton broth, 200 pounds of chicken broth, 112 pounds of arrowroot, 75 pounds of Devonshire cream, bovril, virol, champagne, and other foods and drinks which are specially good for the sick.

There is plenty to drink for the healthy, too. Altogether, there are about 10,000 bottles of champagne, whisky, brandy, and various wines, with 800 gallons of rum. Lastly, there are 1,800 pounds of tobacco, partly in packets and partly in the form of plugged navy leaf.—London Daily Mail.

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Banana Cultivation in Fiji.—The exportation of fruits, and especially of bananas, continues to rise, and according to the report of the German Consul, the value of the exports rose from £25,477 in 1898, to £30,606 in 1899. Nevertheless this crop is considerably less than could be obtained. The plants are subject to a disease, the cause of which is not as yet ascertained. During the first year no injurious appearances are remarked, and the plants bear handsome bunches of fruit, but suddenly they become unhealthy and must be grubbed up. With the aim of overcoming the disease, new

plantations are laid down, but under the disadvantage of getting always further from the seaports. Some of the planters are importing varieties of bananas from other countries, in the hope of obtaining one or more which may resist the disease.—Gardeners' Chronicle.

Rubber in Tahiti.—In 1850, a rubber-tree known under the names of Hevea brasiliensis, Hevea guyanensis, Siphonia elastica, or Jatropha elastica, was introduced into Tahiti, and the results obtained are reported to have been excellent. Nothing since, however, has been done in the matter, although it is admitted that the production of rubber would add materially to the resources and revenues of this country. The trees most suitable to the climate of Tahiti are alleged to be the Hevea brasiliensis and the Castilloa elastica, whose seeds are said to germinate naturally in the ground where they fall, and whose sap coagulates best in the open air.

Sugar experts continue to recommend that milk of lime be no longer used in sugar manufacture; lumps of quick lime are preferable; there is economy from several standpoints. It is a mistake to add to the beet juice the total caustic lime in one operation; under these circumstances its hydration when in contact with the juice evolves a temperature as high as that found during double carbonatation and after a certain period there remains only hydrahat lime in the juice that is undergoin gcarbonatation.—Sugar Beet.

Careful experiments quoted in Bulletin No. 26, issued by the United States Department of Agriculture, gave the following showing; Forty apple blossoms, protected, gave no fruit, and the same number of blossoms exposed to bee work gave 15 fruits; 140 pear blossoms, protected, gave no fruit, and the same number exposed gave 7 fruits; 300 cherry blossoms, protected, gave 9 fruits, and the same number exposed gave 119 fruits; 60 strawberry blossoms, protected, gave 9 fruits, and the same number exposed gave 27 fruits; 184 raspberry blossoms, protected, gave 93 fruits, and the same number exposed gave 160 fruits; 10 heads of clover blossoms (red), protected, gave no seed, and the same number exposed gave 191 seeds; 10 heads of clover blossoms (white), protected, gave no seed, and the same number exposed gave 541 seeds. This is, indeed, a very favorable showing for the honey bee, at least as claimed by our beekeepers.

The Talisman That Brings Success.—What more can I say in answer to your queries? I hardly know. Work, work, always work, is the only talisman. The goods of life are not unfairly apportioned, as some suppose. The man of leisure and of "pleasure" can hardly complain if he is not also

a man of wealth and of health. Success in one career is the reward of sacrifices made for its sake.

I do not say that hard work has not its own liberty, its own enlargement, its own relaxation. It has all these. It has also its own romance—a romance that does not exist for the mere dilettante. The trifler trifles even with happiness. I think that a man who makes a great business must put himself into it; but I do not mean by that that he must necessarily become a machine. Against that notion I would put a long list of names, beginning with Peabody and not ending with Carnegie.

OILED ROADS.—During the recent rains the practical value of oiled roads has been very apparent. The peculiar adhesiveness of the oil-soaked dust renders washing a minimum as well as doing away with the dust. The supervisors of Los Angeles county have just purchased several thousand barrels of oil for use on the roads and other counties are taking similar action. A number of serious problems yet to be solved before we get the maximum of result at the minimum of expense. Whether the oil does better put on hot or cold; whether several light applications are better than one thorough soaking; whether the asphalt residue, after the oil is partially refined, is better, or whether the oil in its natural state. All these are problems to be carefully and systematically tested.—Los Angeles Paper.

WILL CEASE BUYING SUGAR IN EUROPE.

Washington, D. C.—"The obvious and sustained friendliness of the United States Government to Cuba, the impending increase of sugar production in Porto Rico, Hawaii and the Philippines, added to the steady and rapid development of the beet sugar industry throughout a large area of the United States, all point to an inevitable and definite decline in European sugar exports to our country."

This statement appears in an interesting report from Consul-General Mason at Berlin to the State Department, dated October 4th, showing the damage which the sugar production of Cuba in particular is dealing to the sugar exporters of Europe. It is generally recognized, says Mr. Mason, that the beet sugar industry of Central Europe is approaching a critical juncture. Germany, Austria-Hungary, France and Russia, it is stated, are now gathering a beet crop which will yield an output of sugar far surpassing in quantity that of any previous year. Unfortunately for Germany, this overwhelming production comes at a time when industrial depression and a short wheat and rye crop have seriously reduced the purchasing capacity of the poorer classes. A high commercial authority, says Mr. Mason, estimates the decline in sugar consumption in Germany during the fiscal year at 75,000 tons.

"To complete and still further darken the shadow," says the Consul-General, "Cuba has reappeared as a vigorous and threatening competitor in the United States, which during the past years has taken an average of 283,000 metric tons of German sugar, valued at $12,614,000 per annum." These conditions, it is stated, have sent the price of sugar in the market at Magdeburg down to the lowest point reached during the critical year 1894-95.

Great interest has been awakened in Germany by the recent visit to Washington of Governor-General Wood of Cuba, and the conviction is growing that, notwithstanding all doubts and suspicions, Cuba is really about to begin the career of an independent state under the generous and sympathetic protection of the United States, and under conditions which will favor the development of the sugar industry of the island to a point beyond the highest productiveness of former years.

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GIVE OIL FUEL A TRIAL.

On account of almost all of the Louisiana sugar manufacturers having already contracted for their coal supplies for this year's campaign previous to the discovery of petroleum at the Beaumont oil fields, comparatively few were able to avail themselves of the opportunity to purchase the oil fuel for the entire operation of their factories. This is very much regretted by the large number who are desirous of taking advantage of the liquid fuel, for such a saving as may be effected by its adoption is not to be lightly passed over in these times of reduced sugar prices.

A wise move made by a number of planters who had already purchased their coal supplies, is the fitting up of one or two furnaces in their factories with oil burning appliances and the purchasing of a small amount of oil to operate same, so as to give the merits of the fuel a thorough and personal trial. This move cannot be too warmly commended, for a planter is thus enabled to convince himself as to the advantages and saving to be derived by burning oil, and the disadvantages, if any should exist. Throughout the Teche country a number of sugar manufacturers have seen the advisability of pursuing such a course and are now making arrangements for the limited use of oil this campaign.—Louisiana Sugar Planter.

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Rotary Disc Plows.—Within the last few years the rotary disc plow has come into use, and, from the smallness of the cost of plowing the land with it, is likely to receive wide adoption. As in its method of cultivating the soil, and especially in its manner of disposing of the vegetable substances which are on the surface, it differs entirely from the turn-over plow, comparative experiments ought to be made for the purpose of ascertaining the effects which follow from

the continued use of each of these plows, as well on the plant-food ingredients of the soil, as on the crop-yields and their permanence. It is possible that instead of using either plow exclusively, the two used in conjunction may be found to give better results than either by itself; and if this be the case, we ought to find out in what manner they can be made to best supplement each other. I am inclined to expect good results from a system of covering the stubbles immediately after harvest with a many-furrow stubble plow, followed after an interval of a few months by a rotary disc plow for stirring the soil deeply.—Cor. Ag. Gazette of N. S. Wales.

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LONGEST SUBMARINE CABLE IN THE WORLD.

The United States is about to embark on what will be one of the greatest undertakings of the Twentieth century. This is the laying of the trans-Pacific cable, which will stretch from San Francisco to Manila, touching only at Honolulu and Guam.

The cable, which is now being manufactured, will be the longest submarine cable in the world, extending to no less than 8,000 miles. Indeed, the next longest is not even half as long. With this new addition, there will be sufficient length of submarine cables in the world to more than girdle the earth eight times, or reach two-thirds of the way to the moon.

The pathway for the cable has already been mapped out by the United States steamship Nero which has made nearly a thousand soundings for the purpose. The estimate cost of this great undertaking is $20,000,000; and the cable is to be in actual operation within a couple of years.

In the manufacture of this vast length of cable the following enormous quantity of material will be used: 1,980 tons of copper wire, 1,260 tons of gutta percha, 2,300 tons of jute yarn, 4,300 tons of compound and tar, and 12,000 tons of steel wire. When completed the weight of the cable will be equal to that of forty-eight locomotives of the standard size.

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MORE SUGAR NOW THAN IS NEEDED.

The Commercial club of Chicago was entertained recently by an address on "Reciprocity with Cuba," by William C. Gregg of the Gregg-Seager company. Mr. Gregg illustrated many of his points by the aid of charts, which he had prepared. He takes the stand that the United States should not encourage Cuba to go into the cane sugar industry.

"Statistics show," said Mr. Gregg, "that within five years, through the natural development of the beet sugar and cane sugar industries of the United States, Porto Rico, Hawaii and the Philippine islands, those countries can produce all the sugar which will be necessary to the United States, and

can do this without the aid of Cuba. The surplus of the world's sugar for the year 1901 is 1,589,000 tons; last year it was 1,148,000 tons.

"In the face of a growing surplus, the price must go down, and so it would be no kindness to Cuba to now encourage her in the sugar industry. Rather, the United States should encourage Cuba in diversified tropical agriculture—the production of hemp, rubber, cocoa, spices, and the like. While Cuba would be making the sugar experiment under our favorable legislation, the experiment, if successful, would wipe out the domestic beet sugar industry and the cane sugar industry of the United States. For every dollar of enhancement which we might give to Cuba's sugar industry, we would lose corresponding dollars here at home.

"We produce this year twice as much beet sugar in the United States as we did last year—enough in volume for Spain, Portugal, and some to spare. And we hope soon to have an additional advantage in occupying irrigated land contiguous to us.

"As for the sentimental reasons for aiding Cuba, I believe the debt is already discharged. As to the Platt amendment preventing Cuba from making profitable reciprocity deals with other countries, I would ask, What other countries? Not England, for example—for Jamaica sends most of her sugar here rather than to the parent country.

"As to the imminent danger of bankruptcy to Cuba, so largely advertised by the sugar trust—they are paying $1 a day for common field labor in Cuba, which is above the normal price in other tropical countries.

"As to annexation of Cuba, I believe it is time enough to do that when Cuba asks it. If Cuba were annexed we could deal differently with her. I doubt if Cuba will soon ask for annexation. Her negro population represents one-third of her total voting population, and the negro will oppose annexation.

"In five years it is estimated that 5,000,000 tons of cane sugar can be produced in the Philippines. By encouraging the sugar industry there we might in those five years pacify the islands and be enabled to withdraw many of our soldiers now being maintained there.

"The difference in Europe between the price of raw and of granulated sugar is 25 cents per 100 pounds; but for the same date the New York quotations show the difference charged by the sugar trust to be $1.15 a hundred pounds. The trust can control shipments when the shipper is not acquainted and makes his shipments in bulk, easier than the sugar producer at home. But the trust does not control the beet sugar industry. The beet sugar people have been wandering in the wilderness for many years, and now, when at the gateway of the promised land, they find the Cubans asking for admission. There is no room there for both."

HONOLULU STOCK AND BOND EXCHANGE, MAY 15, 1902.

STOCK	Capital Authorized	Shares Issued	Capital Paid up	Par Value	Last Sale
MERCANTILE					
C. Brewer & Co	$ 1,000,000	10,000	$ 1,000,000	$ 100	375
N. S. Sachs' Dry G'ds Co. L'd.	60,000	600	.....	100	100
L. B. Kerr & Co., Ltd	200,000	4,000	.....	50	
SUGAR					
Ewa Plantation Company	5,000,000	250,000	5,000,000	20	24
Hawaiian Agricultural Co	1,000,000	10,000	1,000,000	100	270
Hawaiian Com'l & Sugar Co.	10,000,000	100,000	2,312,750	100	38
Hawaiian Sugar Company	2,000,000	100,000	2,000,000	20	25
Honomu Sugar Company	750,000	7,500	750,000	100	130
Honokaa Sugar Company	2,000,000	100,000	2,000,000	20	11
Haiku Sugar Company	500,000	5,000	500,000	100	.....
Kahuku Plantation Company	500,000	25,000	500,000	20	24
Kihei Plant. Co. Ltd,	2,500,000	50,000	2,500,000	50	10½
Kipahulu Sugar Company	160,000	1,600	160,000	100	....
Koloa Sugar Company	500,000	5,000	500,000	100	164
McBryde Sug. Co. Ltd.	3,500,000	175,000	3,500,000	20	6½
Oahu Sugar Co	3,600,000	36,000	3,600,000	100	90
Onomea Sugar Co	1,000,000	50,000	1,000,000	20	24½
Ookala Sugar Plantation Co.	500,000	25,000	500,000	20	8
Olaa Sugar Co. Ltd., Assess.	2,500,000	125,000	865,000	20	5¼
Olaa Sugar Co. Ltd., Paid up	2,500,000	125,000	2,500,000	20	13
Olowalu Company	150,000	1,500	150,000	100	.....
Paauhau Sug. Plantation Co.	5,000,000	100,000	5,000,000	50	.....
Pacific Sugar Mill	500,000	5,000	500,000	100	.....
Paia Plantation Company	750,000	7,500	750,000	100	250
Pepeekeo Sugar Company	750,000	7,500	750,000	100	.....
Pioneer Mill Company	2,250,000	22,500	2,250,000	100	74
Waialua Agricultural Co	4,500,000	45,000	4,500,000	100	65
Wailuku Sugar Company	700,000	7,000	700,000	100	370
Waimanalo Sugar Company	250,000	250,000	250,000	100	160
Waimea Mill Company	125,000	125,000	125,000	100	87
MISCELLANEOUS					
Wilder Steamship Company	500,000	5,000	500,000	100	100
Inter-Island Steam Nav. Co.	600,000	6,000	600,000	100	100
Hawaiian Electric Company	500,000	5,000	500,000	100	110
Honolulu R. T. & Land Co	250,000	2,500	250,000	100	100
Mutual Telephone Company	150,000	13,900	139,000	10	10
Oahu Railway & Land Co	4,000,000	40,000	4,000,000	100	90
BANKS					
First National Bank	500,000	5,000	500,000	100	.....
First Am. Sav. B. & Trust Co.	250,000	2,500	250,000	100	.....
BONDS	Amt. of Issue				
Hawaiian Govt. 5 per cent	1,251,200	Dec. 31, 1900	.....	.....	97¼
Hilo Railroad Co., 6 per cent	1,000,000	750,000	.....	.....	.....
Hono. R. T. & L. Co, 6 p. c.	300,000	.....	.....	.....	.....
Ewa Plantation 6 per cent	500,000	.....	.....	.....	101¾
Oahu Railway & L'd Co 6 p. c.	2,000,000	.....	.....	.....	104½
Oahu Plantation 6 per cent	750,000	.....	.....	.....	100
Olaa Plantation 6 per cent	1,250,000	.....	.....	.....	.....
Waialua Agr. 6 per cent	1,000,000	.....	.....	.....	101

PLANTATION DIRECTORY.

Island and Name.		Manager.	Post Office
OAHU.			
EwaPlantation Co	*	G. F. Renton	Honouliuli
Waianae Sugar Co. Ltd	***	Fred Meyer	Waianai
Waialua Agricultural Co	*	W. W. Goodale	Waialua
Kahuku Plantation Co	xx	Andrew Adams	Kahuku
Waimanalo Sugar Co	**	G. C. Chalmers	Waimanalo
Oahu Plantation Co	x	Aug. Ahrens	Waipahu
Honolulu Sugar Co	**	J. A. Low	Aiea
Heeia Agricultural Co. Ltd	*x*	W. W. McGowan	Heeia
Laie Plantation	x*x	S. E. Wooley	Laie
MAUI.			
Olowalu Sugas Co	**	E. Kruse	Lahaina
Pioneer Mill Co	x	L. Barckausen	Lahaina
Wailuku Sugar Co	**x	C. B. Wells	Wailuku
Hawaiian Commercial & Sugar Co	x*	H. P. Baldwin	Spreckiesville
Paia Plantation	x*	D. C. Lindsay	Paia
Haiku Sugar Co	x*	H. A. Baldwin	Hamakuapoko
Hana Plantation	xx	K. S. Gjerdrum	Hana
Hamoa Plantation	**x	J. R. Myers	Hamoa
Kipahulu Sugar Co	x	A. Gross	Kipahulu
Kihei Plantation	x*	James Scott	Kihei
Maui Sugar Co	‡	W. S. Akana	Huelo
HAWAII.			
Paauhau Plantation	**	Jas. Gibb	Honokaa
Hamakua Mill Co	*x	A. Lidgate	Paauilo
Kukaiau Plantation	x	J. M. Horner	Paauilo
Kukaiau Mill Co	*x	E. Madden	Paaulio
Ookala Sugar Co	**x	W. G. Walker	Ookala
Laupahoehoe Sugar Co	*x	C. McLennan	Papaaloa
Hakalau Plantation	**	Geo. Ross	Hakalau
Honomu Sugar Co	**x	Wm. Pullar	Honomu
Pepeekeo Sugar Co	*x	H. Deacon	Pepeekeo
Onomea Sugar Co	**x	J. T. Moir	Papaikou
Hilo Sugar Co	**	J. A. Scott	Hilo
Hawaii Mill Co	x	W. von Graevemeyer	Hilo
Waiakea Mill Co	*x	C. C. Kennedy	Hilo
Hawaiian Agricultural Co	**x	C. M. Walton	Pahala
Hutchinson Sugar Plantation Co	**	G. C. Hewitt	Naalehu
Union Mill Co	*x	Jas. Renton	Kohala
Kohala Sugar Co	*	E. E. Olding	Kohala
Pacific Sugar Mill	x**	D. Forbes	Kukuihaele
Honokaa Sugar Co	x**	Jno. Watt	Honokaa
Kona Sugar Co	xxx	J. Cowan	Holualoa
Olaa Sugar Co	xx*	F. B. McStocker	Olaa
Puna Sugar Co	xx*	W. H. Campbell	Kapoho
Halawa Plantation	x*x	T. S Kay	Kohala
C. F. Hart, (Niulii)	*x	R. Hall	Kohala
Hawi Mill & Plantation	††	John Hind	Kohala
KAUAI.			
Kilauea Sugar Co	**	G. R. Ewart	Kilauea
Gay & Robinson	x*x	Gay & Robinson	Makaweli
Makee Sugar Co	**x	G. H. Fairchild	Kealia
Grove Farm Plantation	x	G. N. Wilcox	Lihue
Lihue Plantation Co	x	F. Weber	Lihue
Koloa Sugar Co	x	P. McLain	Koloa
McBryde Sugar Co	*x	W. Stodart	Eleele
Hawaiian Sugar Co	x*	W. A. Baldwin	Makaweli
Waimea Sugar Mill Co	*	J. Fassoth	Waimea
Kekaha Sugar Co	x	H. B. Faye	Kekaha

Key	Honolulu Agents	
*	Castle & Cooke	(4)
**	W. G. Irwin & Co	(8)
***	J. M. Dowsett	(1)
x	H. Hackfeld & Co	(9)
xx	M. S. Grinbaum & Co	(2)
xxx	McChesney & Sons	(1)
*x	T. H. Davies & Co	(8)
**x	C. Brewer & Co	(7)
x*	Alexander & Baldwin	(5)
x**	F. A. Schæfer & Co	(2)
xx*	B. F. Dillingham & Co	(2)
x*x	H. Waterhouse & Co	(3)
x	C. Bolte	(1)
‡	Wong Kwai	(1)
††	Hind, Rolph & Co	(1)